Volume I - Main Report

# ENVIRONMENTAL IMPACT STATEMENT

Relocation of U.S. Army Chemical School
and U.S. Army Military Police School
to
Fort Leonard Wood, Missouri

March 1997

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## ENVIRONMENTAL IMPACT STATEMENT ORGANIZATION

This Environmental Impact Statement (EIS) describes the anticipated impacts of relocating the U.S. Army Chemical School and U.S. Army Military Police School to Fort Leonard Wood. It identifies and describes the proposed actions, alternatives to these actions, and related environmental effects as required by the President's Council on Environmental Quality regulations, the National Environmental Policy Act and Army Regulation 200-2. The main body of the EIS consists of Volumes I and II. In addition, Volumes III and IV have been prepared as supporting documents, with limited distribution. All four volumes of the EIS are available for review at listed information repositories or upon request. A complete Table of Contents for each volume has been included in Volume I. A summary of the contents of Volumes I - IV is provided below.

### VOLUME I

**EXECUTIVE SUMMARY** provides an overview of the information presented in the EIS but is not intended to replace the detailed evaluation presented in the body of the document.

Section 1 **PURPOSE, NEED AND SCOPE** describes the base closure and realignment decision-making process, why the EIS is being prepared, the scope of the document, and the EIS public involvement process.

Section 2 **OVERVIEW OF THE PROPOSED ACTION** describes relevant background information associated with the proposed action and an overview of the proposed action analyzed in the EIS.

Section 3 **DESCRIPTION OF ALTERNATIVES - INCLUDING THE PROPOSED ACTION** provides a discussion of how the EIS study alternatives were developed, and a description of alternatives to be evaluated in the EIS (including a detailed discussion of the Army's proposed implementation action).

Section 4 **AFFECTED ENVIRONMENT** describes the existing physical, social and economic characteristics of Fort Leonard Wood and its environs.

Section 5 **ENVIRONMENTAL CONSEQUENCES** provides an analysis of the environmental and socioeconomic effects of the proposed action and alternatives.

Section 6 **LIST OF PREPARERS** identifies the professional and technical staff responsible for the preparation of the EIS, and provides a summary of their qualifications.

Section 7 **DISTRIBUTION LIST** identifies public officials, public agencies, public interest groups, organizations, and individuals that received copies of the EIS.

Section 8 **INDEX** provides an alphabetical list of topics addressed in the EIS.

Section 9 **REFERENCES** provides a listing of materials used in the development of the EIS.

Section 10 **PERSONS CONSULTED** identifies public agencies, public interest groups, organizations, and individuals that were consulted during the development of the EIS.

### VOLUME II

**IMPACT ANALYSIS MATRICES** have been included to graphically illustrate the anticipated impacts of implementing the proposed BRAC action at FLW. These matrices are intended to be used in association with the narrative and tabular data provided in Section 5, *Environmental Consequences*, of Volume I. **EIS REVIEW COMMENTS AND RESPONSES** for all verbal and written comments received during the comment period have also been included in Volume II.

### VOLUME III

**TECHNICAL APPENDICES** includes materials that support the development of the EIS. Volume III is a supporting document, with limited distribution, which is available for review at listed public repositories (see subsection 1.4.6.3) or upon request.

### VOLUME IV

**IDENTIFICATION AND SCREENING OF ALTERNATIVES TO ACCOMPLISH TRAINING GOALS AT FORT LEONARD WOOD** documents the process used to formulate the training method alternatives that are analyzed in the EIS. Volume IV is a supporting document, with limited distribution, which is available for review at listed public repositories or upon request.

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**FINAL ENVIRONMENTAL IMPACT STATEMENT**
**RELOCATION OF U.S. ARMY CHEMICAL SCHOOL**
**AND U.S. ARMY MILITARY POLICE SCHOOL**
**TO**
**FORT LEONARD WOOD, MISSOURI**

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# FINAL ENVIRONMENTAL IMPACT STATEMENT

**Lead Agency:** Department of the Army

**Cooperating Agency:** U.S. Fish & Wildlife Service

**Title of Proposed Action:** Relocation of the U.S. Army Chemical School and U.S. Army Military Police School to Fort Leonard Wood, Missouri

**Affected Jurisdictions:** Counties of Pulaski, Phelps, Texas and Laclede, Missouri; and cities of St. Robert, Waynesville, Richland, Dixon, Crocker, Rolla, Houston and Lebanon, Missouri.

**Prepared By:** Kansas City District, Corps of Engineers

**Reviewed By:** U.S. Army Engineer Center and Fort Leonard Wood, Missouri

**Recommended for Approval By:** U.S. Army Training and Doctrine Command, and the Department of the Army

**Approved By:** Office of the Secretary of the Army

**Abstract:** The Base Realignment and Closure (BRAC) action analyzed in this Final Environmental Impact Statement (FEIS) is the directed relocation of the U.S. Army Chemical School and the U.S. Army Military Police School to Fort Leonard Wood (FLW), Missouri from Fort McClellan, Alabama. This action is mandated by the Base Closure and Realignment Act of 1990 (Public Law 101-510). Therefore, the DEIS focuses on alternative methods of implementing these BRAC actions at FLW. Alternatives considered for realignment of the BRAC training missions include the: No Action Alternative; Relocate Current Practice (RCP) Alternative; Optimum Training Method (OPTM) Alternative; and the Environmentally Preferred Training Method (EPTM) Alternative. Alternatives considered for providing required support facilities include the No Action Alternative, and three land use and facility siting implementation alternatives. The final element of the planned action, realignment of associated personnel, is considered in the context of a: No Action Alternative; and Total Early, Total Late, and Phased Move alternatives. The Army has identified their Preferred Action in the FEIS which includes implementation of the OPTM Alternative for realigning training missions, the Combined Headquarters and Instruction Land Use and Facility Plan Alternative to provide required support facilities, and the Phased Move Alternative to relocate personnel from Fort McClellan.

Based on the analysis included in this FEIS, adverse impacts that would occur as a result of implementing the Army's proposed BRAC actions at FLW include: a reduction of ambient air quality as a result of fog oil obscurant training; training activities and tree clearing that result in a "may effect" finding to Federally listed threatened and endangered species; the potential for loss of soil resources and accelerated erosion resulting from BRAC construction projects; the release of unburned fuel that could impact soil and water resources at the expedient flame range; and human health risks for trainers and students involved with obscurant training. Beneficial impacts include increased operational efficiency and training effectiveness associated with the collocation of the Engineer School, the Military Police School and the Chemical School; short term economic gains associated with BRAC construction activities; and long term economic gains associated with the transfer of the Chemical School and Military Police School missions to FLW.

**FEIS Waiting Period:** A 30 calendar day waiting period will commence upon publication of the Notice of Availability for this Final EIS in the *Federal Register.*

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# EXECUTIVE SUMMARY

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# Executive Summary

## ES.1 INTRODUCTION

The Department of the Army (DA) is reducing its force structure in response to changing global security requirements. These changes result in a need for fewer installations to station the smaller force. The process used to identify installations that will be closed, and installations to gain realigned and relocated missions, was established by the Defense Base Closure and Realignment Act of 1990 (1990 Base Closure Act), Public Law 101-510. Recommendations of the Base Closure and Realignment Commission (Commission) require the closing of Fort McClellan (FMC), Alabama, and relocation of the U.S. Army Military Police School and the U.S. Army Chemical School to Fort Leonard Wood (FLW), Missouri. In addition, the Commission's recommendation stated that the Chemical Defense Training Facility (CDTF) will continue to operate at FMC until such time as the capability to operate a replacement facility at FLW is achieved. The Commission's recommendations have become Federal law in accordance with Section 2904(b), of Public Law 101-510, November 5, 1990.

Pursuant to the National Environmental Policy Act of 1969 (NEPA) and its implementing regulations, the Army has prepared this Environmental Impact Statement (EIS) to address the environmental and socioeconomic impacts of relocating these schools and their related mission activities to FLW. This action is required to comply with the 1990 Base Closure Act, and to continue the essential mission functions performed by the Military Police School and the Chemical School.

The 1990 Base Closure Act exempts the Commission's decision-making process from the provisions of NEPA. The law also relieves the Department of Defense (DOD) from the NEPA requirement to consider the need for closing, realigning or relocating functions, and from looking at alternative installations to close or realign. However, the Army must still prepare environmental impact analyses to evaluate the process of property disposal; and the process of relocating functions from an installation which is being closed or moved to another military installation. These analyses must be completed after the receiving installation has been selected, but before the functions are relocated. The impacts of the disposal and reuse of property at FMC will be evaluated in a separate EIS in accordance with Army policy for analysis of Base Realignment and Closure (BRAC) related actions. Therefore, this EIS is limited to an analysis of alternative methods of implementing the Military Police School and Chemical School missions at FLW, Missouri.

## ES.2 FORT LEONARD WOOD SETTING AND MISSION

The U.S. Army Engineer Center and Fort Leonard Wood (USAECFLW) is located south of Interstate 44, about 120 miles southwest of St. Louis, Missouri, and 85 miles northeast of Springfield, Missouri. The

installation occupies approximately 62,900 acres of the Ozark Plateau region, located primarily in Pulaski County; with small portions located in Texas and Laclede counties. The land is defined by the Big Piney River on its eastern boundary and Roubidoux Creek on the western edge. Much of the surrounding land is part of the Mark Twain National Forest. The towns of Waynesville and St. Robert are the closest municipalities to Fort Leonard Wood. Waynesville is the Pulaski county seat, and the commercial center of St. Robert straddles the Interstate 44 business spur leading south into the installation. Other towns in the immediate area include: Rolla, Jefferson City, Big Piney, Roby, Plato, Lebanon, Crocker, Dixon, Iberia, Richland, Licking, and Vienna.

The primary mission of the U.S. Army Engineer Center is to train enlisted and officer personnel (including all branches of the service) in basic combat training, military engineering and motor vehicle operations. This includes: bridging, demolitions, placement and removal of land mines; placement and breaching of obstacles designed to prevent movement; and construction and maintenance of buildings, utility systems and roads. Training is also provided in operations, repair and maintenance of heavy equipment, and tracked and wheeled vehicles. To accomplish this mission, the U.S. Army Engineer Center and Fort Leonard Wood is divided into four large elements including: the Engineer Center, the Engineer School, the 1st Engineer Brigade, and the 3rd Training Brigade. In addition to this primary mission the USAECFLW serves as the home for numerous U.S. Army Forces Command operational units.

In addition to providing land, equipment and facilities for mission-related activities, the installation provides for the housing and general living needs of many of its residents. This includes support services such as maintenance of installation roadways, buildings, grounds and utility systems; and numerous support functions including public health and welfare, recreation and commercial services.

## ES.3 PROPOSED ACTION

Subsection 1.1 of the EIS describes the legislative process used to determine military installations to be closed, and those to receive missions. As a result of this process, the Army is now required to relocate the Military Police School and the Chemical School to FLW. Therefore, the decision to be made by the Army as a result of this EIS is focused on identification of the preferred method of implementing the mandated action at FLW.

The proposed action is described in the context of three primary elements including:

- **training mission** activities to be relocated to FLW;
- **facilities** required to support relocated actions; and the
- **population** to be relocated to FLW as a result of the action.

### ES.3.1 Training Mission Activities to be Relocated to FLW

The **U.S. Army Military Police School** has the mission to provide education and training of military police soldiers. Military police students are trained in traditional police functions such as traffic control and crime investigation, fraud investigation, combating terrorism, hostage negotiation, protective services, and counter narcotics investigations. Students are also trained in the areas of battlefield circulation, area security, prisoner of war and civilian prisoner handling, and police intelligence.

The **U.S. Army Chemical School** has the mission to provide education and training of selected U.S. military, foreign military and civilian personnel. These students are trained to allow them to: detect and identify Nuclear, Biological and Chemical (NBC) agents; protect themselves and others from harm caused by NBC agents; and employ smoke and other obscurants to increase soldiers combat effectiveness and survivability, and construct and detonate flame field expedient deterrents to protect our troops in battle.

*In consideration of concerns that have been expressed by some groups and individuals, it is also important to note some of the activities that ARE NOT included in the mission of the U.S. Army Chemical School. For example:*

- *The Chemical School does not teach offensive or retaliatory biological or chemical warfare procedures. FLW property will not be used to test or fire chemical weapons.*

- *FLW will not be used to stockpile chemical weapons, manufacture or use toxic bacterial agents, or use toxic nerve agent in any uncontrolled or exterior environment. The Anniston Army Depot (which is located near FMC Alabama, and which includes stockpiles of chemical weapons) is not part of FMC or the Chemical School, and is not dependent on the Chemical School, and will not be moved to FLW.*

- *The operation of the planned CDTF does not require the burning or incineration of any hazardous waste (all waste that has traditionally been disposed of by incineration at FMC is neutralized or decontaminated prior to disposal). In addition, under the Army's Proposed Action for relocating the Military Police School and Chemical School training missions to FLW, all decontaminated waste by-products from training at the CDTF will be disposed of off-site. Therefore, a thermal treatment unit or incinerator will not be constructed at the installation under the Army's Proposed Action.*

The mandated action will also relocate units and associated missions to FLW that are required to support the Military Police School and the Chemical School. These support units are identified in subsection 2.3.4 of the EIS. All of the activities evaluated in the EIS are considered to be "directed relocations" which are specifically identified by the Commission or required to implement Commission recommendations. A detailed list of all Chemical School and Military Police School mission activities is provided in subsections 2.4.1 of the EIS.

## ES.3.2 Facilities Required to Support Relocated Actions

Fort Leonard Wood will need to provide facilities (buildings, specialized training facilities and designated training land areas) to meet Chemical School and Military Police School training needs, and the needs of personnel to be relocated to the installation. These needs will be accommodated by a combination of reuse or additional use of existing facilities in their present condition, alteration of existing facilities to make them suitable for new uses or activities, construction of new facilities, and purchase lease or rental of housing in the surrounding civilian community by individual service members. Implementation of the Army's Proposed Action will result in completion of approximately $200 million in military construction projects. Facility requirements have been defined in the context of eight construction packages which are summarized in subsections 2.4.2.1 through 2.4.2.8 of the EIS.

## ES.3.3 Associated Population Increases

Relocation of Chemical School and Military Police School activities will result in the relocation of the following approximate number of military personnel, civilian employees, and dependent family members to FLW.

- 1,599 permanent party military (including permanent change of station military students);
- 3,295 average daily student load of trainees and other students;
- 341 permanent party civilian personnel and 157 other civilian employees;
- 83 average daily student load of civilian students; and
- 3,621 dependent family members.

## ES.4 SUMMARY OF SCOPING ISSUES

The FLW BRAC EIS process includes a number of elements designed to obtain input from review agencies, the general public and various interest groups and organizations. A description of the various public participation elements is provided in subsection 1.4. A thorough scoping process was conducted during the initial stages of this EIS. This process included correspondence and multiple meetings with Federal and state review agencies, conducting a public scoping meeting, and accepting and compiling all written comments provided in response to the scoping initiative. Subsection 1.4.6.4 provides a summary of the key areas of concern or controversy that were identified as a result of the scoping process. Areas that are of primary concern to the public include:

- **Air Quality.** Extensive concerns were raised regarding the Army's initial proposal to construct a thermal treatment unit at FLW to dispose of non-hazardous waste to be produced by the CDTF. Most of the remaining air quality comments were related to: potential impacts associated with planned fog oil obscurant (smoke) generation; the planned use of biological warfare agent simulants; and expedient flame training associated with Chemical School training activities.

- **Hazardous Materials.** Many comments were received expressing concern regarding the potential transportation, storage, use and disposal of hazardous materials associated with the planned relocation actions. The most commonly referenced issues under this category included: the chemical characteristics of fog oil (both prior to and after its use in smoke generators); the potential health effects of fog oil and other materials on soldiers, instructors, and area residents; the potential hazards of shipping materials from FMC to FLW; the potential impacts of the accidental release of hazardous materials including those items used by the Chemical School for radiological training; steps that will be taken to monitor the environment to ensure that the use of new materials do not result in adverse impacts; and procedures to be used to decontaminate and dispose of materials to be used in the CDTF.

- **Biological Resources.** Concerns were identified regarding potential impacts to biological resources that exist within and around FLW. The majority of these comments were associated with planned smoke training activities. Concerns focused on Federally-listed threatened and endangered species, state-listed species, and general wildlife populations and vegetation in the area. These comments included specific references to fish species, insects, amphibians, reptiles and birds (including "neotropical migrants" or song birds).

- **Other Areas of Concern.** Although not to the same extent as the three topics listed above, the public also identified concerns regarding the impact of planned actions on water resources, soils and geologic conditions, permitting procedures and requirements, and impacts on community infrastructure (roads, housing, utilities, schools, etc.). A more detailed summary of issues raised under these (and other) categories is provided in subsection 1.4.6.4 of the EIS.

All scoping comments received were compiled into appropriate categories, and reviewed and used by the EIS study team to focus the impact analyses included in Section 5 on issues of primary concern to the public. In addition, a number of supporting studies were prepared to address concerns identified during the scoping process. Key supporting studies and investigations are listed in subsection 1.5 of the EIS.

## ES.5 ALTERNATIVES (Including the Army's Proposed Action)

Section 3 *(Description of Alternatives - Including the Proposed Action)* provides a graphic (Figure 3.1) and narrative (subsections 3.2.1 through 3.2.3) presentation of the process that was used to develop or "formulate" alternatives to be evaluated in the EIS. Alternatives were developed for each of the primary elements of the action including: 1) relocation of the Chemical School and Military Police School training missions; 2) provision of required support facilities; and 3) relocation of the related population from FMC.

The alternatives structure for each of these elements is described in subsections ES.5.1 through ES.5.3 below.

## ES.5.1 Training Alternatives

The EIS considers four "Relocate Training Mission" alternatives including the:

- No Action Alternative (see subsection ES.5.1.1);
- Relocate Current Practice (RCP) Alternative (see subsection ES.5.1.2);
- Optimum Training Method (OPTM) Alternative (see subsection ES.5.1.3); and
- Environmentally Preferred Training Method (EPTM) Alternative (see subsection ES.5.1.4).

The formulation of these alternatives is fully documented in Volume IV of the EIS. A brief overview of each alternative is provided below:

**ES.5.1.1 No Action Alternative (Training Element).** Analysis of the No Action Alternative as it relates to the "training" element of this EIS considered the impact of not implementing individual training goals associated with the Military Police School and Chemical School missions. As discussed on Table IV.1 of Volume IV of the EIS, it was determined that failing to implement any of the 43 training goals was not reasonable since training in each of the currently identified training goals is deemed to be essential to meeting the mission requirements of the schools. Therefore, the No Action Alternative is not evaluated in detail in the EIS. However, the No Action Alternative (continuation of ongoing and planned (pre-BRAC) activities at FLW) is used as the environmental baseline. This environmental baseline is defined in Section 4, and used as a benchmark against which the impacts associated with the Army's proposed BRAC implementation plan and related alternative plans are evaluated.

**ES.5.1.2 Relocate Current Practice (RCP) Alternative.** The RCP Alternative evaluates relocating all training methods to FLW as they are currently (at the time of the BRAC decision) conducted at FMC. This approach would be the easiest for the Military Police School and the Chemical School since minimal effort would be required to develop, test and revise Programs of Instruction (POIs) that are used to define and control all training activities. The training methods defined by the RCP Alternative were also used as a benchmark to help identify alternative training methods for consideration in the EIS. When viewed in total, the analysis included in this EIS indicates that implementation of the RCP Alternative would result in an overall reduction in training effectiveness and operational efficiency, and substantially higher adverse environmental impacts as compared to implementation of the OPTM Alternative.

**ES.5.1.3 Optimum Training Method (OPTM) Alternative (Army's Proposed Training Action).** The OPTM Alternative was formulated to identify and evaluate the impact of implementing the viable training methods which best met a combination of environmental criteria, and training and operating efficiency criteria as documented in Volume IV of the EIS. As stated above, relative to the RCP Alternative, implementation of the OPTM Alternative will result in substantial improvements in the effectiveness and operational efficiency of training activities, and a substantial reduction in the extent of adverse environmental impacts to occur at FLW. Furthermore, when comparing the impacts of the OPTM Alternative to the EPTM Alternative, the analysis indicates that although the EPTM Alternative would result in some reductions in the extent of adverse environmental impacts, these reductions are relatively small versus the anticipated improvements in training effectiveness and operational efficiency of the OPTM Alternative. Therefore, the OPTM Alternative has been identified as the Army's Proposed Action in this Final Environmental Impact Statement (FEIS).

**ES.5.1.4 Environmentally Preferred Training Method (EPTM) Alternative.** The EPTM Alternative was formulated to evaluate the impact of implementing the combination of viable alternative training methods which received the highest score under the environmental screening criteria that were used

to formulate the EIS alternatives. Based on the analysis included in this EIS, it was determined that implementation of the EPTM Alternative (in comparison to the OPTM Alternative) would result in a substantial reduction in training effectiveness and operational efficiency, while only realizing relatively small reductions in the extent of anticipated adverse environmental impacts.

## ES.5.2 Supporting Facility Alternatives

The EIS considers four alternatives for providing facilities that will be required to support the training activities and personnel to be relocated to FLW. These included a No Action Alternative and three implementation alternatives. Each of the implementation alternatives includes a unique BRAC land use plan (which identifies minor modifications to FLW's existing approved land use plan that would be required to meet the requirement of the new schools); and a facility construction program which identifies the type, extent and location of facility development associated with each alternative.

**ES.5.2.1 No Action Alternative (Supporting Facility Element).** Under the No Action Alternative for this study element, FLW would continue to implement its pre-BRAC land use and facility development plan, but no new facilities would be provided in response to BRAC actions. Therefore, FLW would be required to accommodate or absorb the mandated relocation of the Military Police School and the Chemical School, and associated units, without the benefit of any changes in the installation land use plan, facility alterations or new construction projects. Based on the analyses documented in Appendix C, it was determined that existing facilities at FLW can only support approximately 50 percent of the identified requirements, and that opportunities to lease space off-post are very limited. Therefore, given the fact that the relocation action must be implemented (based on BRAC legislation), it was determined that the No Action Alternative is not reasonable. Accordingly, this alternative is not evaluated in detail in the EIS.

**ES.5.2.2 Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction).** This land use and facility siting and construction alternative locates the headquarters for the three schools (existing Engineer School at FLW, and the Military Police School and Chemical School to be relocated) in Hoge Hall, Lincoln Hall and a new General Instruction Facility (GIF) complex. Officer, Non-Commissioned Officer and leadership (general and applied instruction) training areas as well as the libraries for the three speciality branches will be collocated near the headquarters, and jointly programmed to reduce total construction requirements. Junior enlisted training involving speciality specific training requirements would be concentrated by branch, but located proximate to each other to allow the joint use of common support facilities. This alternative was selected as the Army's Proposed Action for this implementation element because: 1) it is the most effective plan with regard to utilization of existing available facilities at FLW to meet requirements; 2) it has the lowest construction cost of any of the alternatives, and requires the least amount of new construction thereby minimizing related environmental impacts; 3) it provides the highest degree of collocation of similar facilities; 4) it provides the greatest long-term operational cost savings; and 5) it provides the highest potential for synergistic (mutually supportive) training activities at FLW. Appendix C captures a summary of the analysis completed by FLW which identified that this land use and facility plan would result in notable improvements in operational efficiency relative to the other plans. The BRAC land use plan for this alternative and a figure which illustrates the general location of all related projects have been included in Section 3.

**ES.5.2.3 Alternative 1 Land Use and Facility Plan (Combined Headquarters).** This alternative is based on the concept of collocating the headquarters for each of the three schools (existing Engineer School at FLW, and the Military Police and Chemical schools to be relocated) in Hoge Hall and Lincoln Hall. However, three separate "school houses" would be provided, thereby allowing the individual specialty branches to retain more autonomy. The BRAC land use plan for this alternative and a figure which illustrates the general location of all related projects have been included in Section 3.

**ES.5.2.4 Alternative 2 Land Use and Facility Plan (Separate Headquarters).** This alternative would locate the headquarters for the Military Police School and the Chemical School in separate buildings, but with consolidated general instruction and library facilities in the 800-area. The Engineer School would remain in Hoge, Lincoln and Clark halls. The BRAC land use plan for this alternative and a figure which illustrates the general location of all related projects have been included in Section 3.

## ES.5.3 Population Relocation Alternatives

The relocation of the Chemical School and Military Police School to FLW is mandated by BRAC Commission's recommendations which were accepted by the President and Congress. The Army needs to fully coordinate the transfer of people with the transfer of training missions and the availability of facilities required to support these personnel. Therefore, alternatives for relocating these personnel are based on timing issues. Alternatives considered for the relocation of personnel are described below.

**ES.5.3.1 No Action Alternative (Population Relocation Element).** The No Action Alternative for this element of the planned action would assess the impacts of implementing the mandated relocation of the Military Police School and Chemical School to FLW, without allowing relocation of the military and civilian personnel currently assigned to these schools. This would require the use of personnel currently assigned to FLW to perform the mission requirements associated with the Military Police School and Chemical School. Given the size, complexity and specialized expertise of the schools and missions to be relocated to FLW under the planned action, this alternative is not considered to be viable and is not analyzed in the EIS.

**ES.5.3.2 Army's Proposed Population Relocation Alternative (Phased Move).** Subsections 3.5.2 through 3.5.4 of the EIS describe three alternatives that were considered for relocating the supporting population to FLW from FMC. These alternatives include a "Total Early Move" Alternative, a "Total Late Move" Alternative, and a "Phased Move" Alternative. Based on consideration of these options, it was determined that the Total Early Alternative was neither viable nor reasonable and that although viable the Total Late Alternative were not reasonable, and therefore would not be evaluated in detail in the EIS. Accordingly, all implementation scenarios are based on the assumption that the Army will use the Phased Move Alternative. The Phased Move Alternative would involve the relocation of personnel (and related missions and equipment) on a phased schedule (to be accomplished over a period of approximately 9 months) tied to the availability of renovated or new facilities to support specific mission requirements.

## ES.6 ENVIRONMENTAL CONSEQUENCES

Section 5 of the EIS describes the environmental consequences of the Army's proposed implementation actions and associated alternative actions. The impact analysis is presented in four distinct steps which are parallel to the definition of the Army's Proposed Action and alternatives as presented in Section 3. The four impact analysis steps include:

- **Step 1: Training Method Analysis.** An analysis of impacts associated with three alternative methods for implementing Chemical School and Military Police School training goals, is located in subsection 5.2.

- **Step 2: Support Facility Analysis.** An analysis of impacts associated with three "Land Use and Facility Plan" alternatives for providing facilities required to accommodate the relocated missions and training goals, is located in subsection 5.3.

- **Step 3: Population Relocation Analysis.** An analysis of impacts associated with the phased relocation of personnel from FMC to FLW, is located in subsection 5.4.

- **Step 4: Analysis of Cumulative Impacts.** An analysis of cumulative impacts associated with implementation of four potential combinations of alternative Army actions in association with other past, present and reasonably foreseeable future actions is located in subsection 5.5.

## ES.6.1 Step 1: Training Method Alternatives - Impact Summary

The "Step 1" analysis evaluated the impacts of the three implementation training alternatives (the RCP, OPTM/Army's Proposed, and EPTM alternatives) in association with each of the three Land Use and Facility Plan alternatives. This approach was required since it is not possible to identify the impacts of all training activities without considering them in regard to the specific locations where training would occur. This approach also provided the Army with an understanding of impacts associated with each possible combination of training alternatives and land use and facility alternatives.

Based on consideration of each resulting implementation "scenario", it was determined that there are notable differences in environmental impacts associated with the three training method alternatives. However, mixing the three training alternatives with the three land use and facility plan alternatives only identified minimal differences in environmental impacts.

The initial Step 1 analysis (Scenario 1) evaluated the impacts of each training alternative (the RCP, OPTM/Army's Proposed, and EPTM alternatives) based on the assumption that training operations would be conducted at the facility locations identified in the Army's Proposed Land Use and Facility Plan. Table ES.1 provides a comparative summary of adverse and beneficial impacts associated with this implementation scenario. The results of other scenarios considered as part of the Step 1 analysis are fully documented in Section 5.2 of the EIS.

As shown in Table ES.1, implementation of any of the training alternatives has the potential to result in significant adverse impacts to air quality (primarily related to proposed fog oil training), groundwater (associated with proposed Flame Field Expedient training) and threatened and endangered species (associated with use of fog oil and other training materials). The reader should refer to subsection ES.6.4 for a summary of mitigation commitments that will ensure that these impacts are reduced to acceptable levels under the Army's Proposed Action.

In addition, the EIS notes that implementation of the training alternatives (under all alternatives) are expected to result in adverse impacts to noise, surface and groundwater resources, and terrestrial and aquatic resources relative to existing operational baseline conditions. However, continued adherence to FLW standard operating procedures, established environmental management programs, and existing environmental monitoring programs will ensure that these impacts are minimized. In addition, the Final EIS has been expanded to provide a summary of six comprehensive monitoring programs (as described in Volume III, Appendix K) to be implemented by FLW to ensure that impacts to these other resources (including "human health" and "other protected species" do not exceed those predicted to occur in this EIS. These issues are discussed in detail in applicable sections of the EIS.

Based on the results of the Step 1 analysis documented in Section 5, it was determined that implementation of the RCP Alternative would result in substantially greater environmental impacts, and a lower degree of training effectiveness and operational efficiency when compared to the OPTM or EPTM alternatives. Therefore, it was determined that the RCP Alternative would be dropped from further consideration in the cumulative impact analysis process.

**Table ES.1 - Impact Analysis Step 1, Scenario 1: Training Alternatives in Association With the Army's Proposed Land Use and Facility Plan - Comparison of Issues and Impacts**

| Training Activity or Resource Category | Relocate Current Practice Training Alternative | OPTM Training Alternative (Army's Proposed Action) | EPTM Training Alternative |
|---|---|---|---|
| Fog Oil Training | *Significant adverse* impact on air quality - primarily associated with fog oil training using up to 125,500 gallons per year and up to 1,900 gallons per day. Air quality analysis predicts exceedance of National Ambient Air Quality Standards (NAAQS) standard for annual and 24-hr PM-10 .<br><br>**Mitigation Required** (See ES.6.4) | Substantially reduced adverse air quality impacts (relative to RCP Alternative), as a result of reducing annual amount of fog oil to maximum of 84,500 gallons. Annual PM-10 levels relating to this alternative are within NAAQS standards. However, still anticipate *significant adverse* impact on air quality (exceedance of NAAQS standard for 24-hr PM-10) associated with fog oil training using up to 1,200 gallons per day.<br><br>**Mitigation Required** (See ES.6.4) | Further reduced air quality impacts (relative to RCP and OPTM Alternatives), as a result of reducing annual amount of fog oil to maximum of 49,500 gallons. Annual PM-10 levels relating to this alternative are within NAAQS standards. However, still anticipate *significant adverse* impact on air quality (exceedance of NAAQS standard for 24-hr PM-10) associated with fog oil training using up to 1,200 gallons per day.<br><br>**Mitigation Required** (See ES.6.4) |
| Flame Field Expedient Deterrents Training | Use of up to 36,900 gallons of fuel per year has potential for *significant adverse* impacts to groundwater, and adverse impacts to surface water and soil resources under this alternative with minimal environmental controls.<br><br>**Mitigation Required** (See ES.6.4) | Use of up to 22,550 gallons of fuel per year would reduce impacts to approximately 60% of those expected for RCP Alt., but would still result in *significant adverse* impact to groundwater and adverse impact to surface water and soil resources. (Alternative includes surface water controls.)<br><br>**Mitigation Required** (See ES.6.4) | Same as OPTM Alternative, *Significant Adverse* Impact.<br><br>**Mitigation Required** (See ES.6.4) |
| Federally-Listed Threatened and Endangered (T&E) Species | Under this alternative, certain training activities (as fully described in the EIS) would be expected to result in a *may affect* impact to T&E Species (which is classified as a *significant adverse* impact).<br><br>Implementation of this alternative would require formal consultation, issuance of a Biological Opinion, and **implementation of Reasonable and Prudent Measures specified by the US Fish and Wildlife Service (USFWS).** | Under this alternative, certain training activities (as fully described in the EIS) result in a *may affect* impact to T&E Species (which is classified as a *significant adverse* impact).<br><br>However, these impacts would be less than those associated with the RCP Alternative due to reduced training materials and activities.<br><br>A Biological Opinion has been issued by the USFWS with an incidental take statement in response to the Army's Proposed Action.<br><br>**Implementation of Reasonable and Prudent Measures that have been specified by USFWS will be Required** (See ES.6.4). Based on implementation of Reasonable and Prudent Measures (RPMs), the USFWS determined that the proposed action will not jeopardize the continued survival of the three federally-listed species. (Also See ES.6.4) | Under this alternative, certain training activities (as fully described in the EIS) would be expected to result in a *may affect* impact to T&E Species (which is classified as a *significant adverse* impact).<br><br>However, these impacts would be less than those associated with both the RCP and OPTM alternatives due to reduced training materials and activities.<br><br>Implementation of this alternative would require formal consultation, issuance of a Biological Opinion, and **implementation of Reasonable and Prudent Measures specified by USFWS.** |

**Table ES.1 - Impact Analysis Step 1, Scenario 1: Training Alternatives in Association With the Army's Proposed Land Use and Facility Plan - Comparison of Issues and Impacts**

| Training Activity or Resource Category | Relocate Current Practice Training Alternative | OPTM Training Alternative (Army's Proposed Action) | EPTM Training Alternative |
|---|---|---|---|
| Other Adverse Environmental Impacts (water, soil, vegetation, human health, etc.) | Overall, this alternative will result in the highest degree of other adverse environmental impacts.<br><br>(See ES.6.4 for discussion of additional monitoring commitments relating to these adverse impacts.) | This alternative results in substantial reductions in adverse environmental impacts for 11 training goals relative to RCP Alt.<br><br>(See ES.6.4 for discussion of additional monitoring commitments relating to these adverse impacts.) | This alternative results in substantial reductions in adverse environmental impacts for 18 training goals relative to RCP Alt.<br><br>(See ES.6.4 for discussion of additional monitoring commitments relating to these adverse impacts.) |
| Economic Development | Anticipate beneficial direct long-term benefits of $15 million increase in annual regional business volume, 159 new jobs and $2.25 million in direct income, plus substantial indirect benefits. | Same as RCP Alternative. | Same as RCP Alternative. |
| Training Effectiveness | Provides highest level of training effectiveness for obscurant training. | Provides improved training effectiveness for 6 of 43 training goals as compared to RCP Alt. | Reduces training effectiveness for 8 of 43 training goals when compared to RCP or OPTM alternatives. |

*Source: Harland Bartholomew & Associates, Inc.*

## ES.6.2 Step 2: Support Facility Alternatives - Impact Summary

The "Step 2" analysis evaluated the impacts of implementing the three Land Use and Facility Plan (LU & FP) alternatives including: 1) the Army's Proposed LU & FP (Combined Headquarters and Instruction); 2) Alternative 1 LU & FP (Combined Headquarters); and 3) Alternative 2 LU & FP (Separate Headquarters). Table ES.2 provides a comparative summary of impacts associated with each of these facility development alternatives.

In addition to the issues summarized in Table ES.2, implementation of the facility alternatives (under all alternatives) are expected to result in adverse short-term impacts to air quality, noise, water resources, and terrestrial and aquatic resources relative to existing operational baseline conditions. However, adherence to FLW standard operating procedures associated with protection of the environment during the construction phase will ensure that these impacts do not reach significant levels. These issues are discussed in detail in applicable sections of the EIS.

Based on the results of the Step 2 analysis, it was determined that implementation of the Alternative 2 LU & FP (Separate Headquarters) would result in the highest impact to threatened and endangered species, the lowest potential to gain synergistic operating benefits, the lowest potential to use existing facilities at FLW to meet requirements, and the highest initial construction cost. Therefore, it was determined that the Alternative 2 Land Use and Facility Plan would be dropped from further consideration in the cumulative impact analysis process.

**Table ES.2 - Impact Analysis Step 2, Support Facility Alternatives - Comparison of Issues and Impacts**

| Issue or Resource Category | Army's Proposed LU & FP (Combined Headquarters & Instruction) | Alternative 1 LU & FP (Combined Headquarters) | Alternative 2 LU & FP Plan (Separate Headquarters) |
|---|---|---|---|
| Infrastructure | Requires approximately 800,000 square feet of new construction to meet requirements.<br><br>Additional traffic will require improvements to existing roadway system (on-post) to maintain acceptable level-of-service. | Requires approximately 1.1 million square feet of new construction.<br><br>Traffic congestion would be reduced due to wider distribution of facilities. No traffic improvements would be required. | Requires approximately 1.2 million square feet of new construction.<br><br>Same as Alternative 1 LU & FP. |
| Geology and Soils | Results in soil disturbance on 987 acres. | Results in soil disturbance on 1,053 acres. | Results in soil disturbance on 1,187 acres. |
| T&E Species | *May affect* determination classified as a *significant adverse* impact associated with loss of 82 acres of moderate quality and 92 acres of low quality Indiana bat habitat and 3 acres of gray bat habitat.<br><br>A Biological Opinion has been issued by the USFWS with an incidental take statement in response to the Army's Proposed Action.<br><br>**Implementation of Reasonable and Prudent Measures that have been specified by USFWS will be Required** (See ES.6.4). Based on implementation of RPMs, the USFWS determined that the proposed action will not jeopardize the continued survival of the three federally-listed species. | *May affect* determination classified as a *significant adverse* impact associated with loss of 21 acres of moderate quality and 271 acres of low quality Indiana bat habitat and 7 acres of gray bat habitat.<br><br>Implementation of this alternative would require formal consultation, issuance of a Biological Opinion, and **implementation of Reasonable and Prudent Measures specified by USFWS.** | *May affect* determination classified as a *significant adverse* impact associated with loss of 40 acres of moderate quality and 201 acres of low quality Indiana bat habitat and 5 acres of gray bat habitat.<br><br>Implementation of this alternative would require formal consultation, issuance of a Biological Opinion, and **implementation of Reasonable and Prudent Measures specified by USFWS.** |
| Economic Development | Direct short-term annual economic impacts of $41 million in business volume; 418 jobs in retail trade; and $5.7 million in direct personal income.<br><br>Results in total estimated construction costs of approximately $200 million. | Direct short-term annual economic impacts of $52.6 million in business volume; 534 jobs in retail trade; and $7.2 million in direct personal income.<br><br>Results in total estimated construction costs of approximately $255 million. | Direct short-term annual economic impacts of $53.6 million in business volume; 544 jobs in retail trade; and $7.4 million in direct personal income.<br><br>Results in total estimated construction costs of approximately $260 million. |
| Operational Efficiency | Collocation of schools (including Headquarters and Instruction facilities) provides maximum positive interaction and efficiency. This alternative also maximizes utilization of existing available facilities at FLW to meet relocating activity needs. | Results in less operational efficiency associated with separate locations for instruction facilities. Substantially less effective than the Army's Proposed LU & FP in utilizing existing facilities to meet relocating activity needs. | Provides lowest degree of operational effectiveness relative to the Army's Proposed and Alt. 1 LU & FP. Least effective of all alternatives in utilization of existing facilities. |

*Source: Harland Bartholomew & Associates, Inc.*

## ES.6.3 Step 3: Population Relocation - Impact Summary

The "Step 3" analysis defines the consequences of relocating the population to FLW under a "Phased Move" scenario. The analysis of this element of the Army's Proposed Action indicates that the relocation

of the population will not result in any significant adverse impacts on the local community or FLW. However, the increase in the number of construction workers during the time that the new facility construction program occurs may have an adverse impact on the local civilian housing market by creating a large temporary demand on local rental units. In addition, it is estimated that there will be a demand for over 550 new owner-occupied housing units in the Pulaski County area as a result of the planned action. A complete discussion of impacts associated with the population relocation element of the Proposed Action is provided in subsection 5.4 of the EIS.

## ES.6.4 Step 4: Cumulative Impact Analysis Summary (Including Mitigation of Significant Impacts)

At the conclusion of the Step 1 analysis of training alternatives, the *RCP Alternative* was eliminated from further consideration. At the conclusion of the Step 2 analysis of Land Use and Facility Plan Alternatives, the *Alternative 2 Land Use and Facility Plan (Separate Headquarters)* was eliminated from further consideration. As explained in subsection 3.5, Step 3 was limited to an evaluation of the *Phased Population Move.* This evaluation/screening process results in four, composite BRAC implementation alternatives that are evaluated in the cumulative impact analysis presented in subsection 5.5. The four composite implementation alternatives include the:

- Army's Proposed Training (OPTM), Army's Proposed LU & FP, and Phased Move
- EPTM Training, Army's Proposed LU & FP, and Phased Move
- Army's Proposed Training (OPTM), Alternative 1 LU & FP, and Phased Move
- EPTM Training, Alternative 1 LU & FP, and Phased Move

The cumulative impact analysis evaluates the direct and the indirect effects of implementing any one of these four composite implementation alternatives in association with past, present and reasonably foreseeable future Army actions at FLW, and the actions of other parties in the surrounding area (where applicable).

Following the presentation of each of the four composite implementation alternatives, a summary section (subsection 5.5.7) has been provided to compare impacts associated with each implementation alternative. This summary also provides a listing of all Army mitigation actions associated with implementing the Army's Proposed Action.

Subsection 5.5 provides a complete discussion of cumulative impacts that are expected to occur. Table ES.3 provides a summary of the significant adverse impacts for the alternatives being considered and mitigation actions that the Army intends to implement to reduce or eliminate these impacts. Resource categories that did not have significant adverse impacts are not included in this summary table, but all such impacts are identified in the EIS. In addition, mitigation actions that will be implemented by the Army to address other adverse impacts (i.e., those adverse impacts that were not identified as significant based on consideration of individual elements of the action, or the cumulative impact of all BRAC actions and other past, present and reasonably foreseeable actions) are summarized as a note included at the bottom of Table ES.3. All mitigation commitments will be documented in the Record of Decision.

**Table ES.3 - Summary of Significant Impacts and Mitigation Actions for Each Cumulative Impact Scenario ***

| Resource Category | 1. Army's Proposed Training (OPTM) with Army's Proposed LU & FP and Phased Move (Scenario 1) | 2. EPTM Training with Army's Proposed LU & FP and Phased Move (Scenario 2) | 3. Army's Proposed Training (OPTM) with Alt. 1 LU & FP & Phased Move (Scenario 3) | 4. EPTM Training with Alt. 1 LU & FP & Phased Move (Scenario 4) |
|---|---|---|---|---|
| Air Quality | **Significant Adverse Impact**<br><br>Annual amount of fog oil to maximum of 84,500 gallons. Annual PM-10 levels relating to this alternative are within NAAQS standards. However, still anticipate *significant adverse* impact on air quality (exceedance of NAAQS standard for 24-hr PM-10) associated with fog oil training using up to 1,200 gallons per day.<br><br>**Mitigation:**<br><br>The Army will mitigate air quality impacts to non-significant levels by:<br><br>1. Adhering to annual and daily use levels specified in the existing air permit (65,000 gallons per year and approx. 481 gallons per day).<br><br>2. Complying with all other terms & conditions of existing air permit (see Appendix. J), including air monitoring (see Appendix. K).<br><br>As discussed in subsection 5.5.3.3.3, the Army intends to pursue a revised air permit with Missouri Department Natural Resources (MDNR) after further evaluation of the assumptions used for dispersion modeling. | **Significant Adverse Impact**<br><br>Annual amount of fog oil up to 49,500 gallons. Annual PM-10 levels relating to this alternative are within NAAQS standards. However, still anticipate *significant adverse* impact on air quality (exceedance of NAAQS standard for 24-hr PM-10) associated with fog oil training using up to 1,200 gallons per day.<br><br>**Mitigation:**<br><br>Mitigation requirements would be similar to those identified under Scenario 1 since the exceedance of significance thresholds is associated with the daily maximum fog oil use levels that are the same for all alternatives. | **Significant Adverse Impact**<br><br>Same as Scenario 1.<br><br>**Mitigation:**<br><br>Same as comment under Scenario 2. | **Significant Adverse Impact**<br><br>Same as Scenario 2.<br><br>**Mitigation:**<br><br>Same as comment under Scenario 2. |

| Table ES.3 - Summary of Significant Impacts and Mitigation Actions for Each Cumulative Impact Scenario * | | | | |
|---|---|---|---|---|
| **Resource Category** | **1. Army's Proposed Training (OPTM) with Army's Proposed LU & FP and Phased Move (Scenario 1)** | **2. EPTM Training with Army's Proposed LU & FP and Phased Move (Scenario 2)** | **3. Army's Proposed Training (OPTM) with Alt. 1 LU & FP & Phased Move (Scenario 3)** | **4. EPTM Training with Alt. 1 LU & FP & Phased Move (Scenario 4)** |
| Ground Water | **Significant Adverse Impact**<br><br>Use of up to 22,550 gallons of fuel per year would reduce impacts to approximately 60% of those expected for RCP Alt., but would still result in *significant adverse* impact to groundwater and adverse impact to surface water and soil resources. (Alternative includes surface water controls.)<br><br>**Mitigation:**<br><br>1. Provide berms around site and retention ponds to control surface water flows (part of initial proposed action design).<br><br>2. Provide impervious liner under the soil at the training site to prevent migration of petroleum products into groundwater. | **Significant Adverse Impact**<br><br>Same as Scenario 1 - no reduction in quantity of fuel to be used.<br><br>**Mitigation:**<br><br>Same as Scenario 1. | **Significant Adverse Impact**<br><br>Same as Scenario 1 - no reduction in quantity of fuel to be used.<br><br>**Mitigation:**<br><br>Same as Scenario 1. | **Significant Adverse Impact**<br><br>Same as Scenario 1 - no reduction in quantity of fuel to be used.<br><br>**Mitigation:**<br><br>Same as Scenario 1. |

**Table ES.3 - Summary of Significant Impacts and Mitigation Actions for Each Cumulative Impact Scenario ***

| Resource Category | 1. Army's Proposed Training (OPTM) with Army's Proposed LU & FP and Phased Move (Scenario 1) | 2. EPTM Training with Army's Proposed LU & FP and Phased Move (Scenario 2) | 3. Army's Proposed Training (OPTM) with Alt. 1 LU & FP & Phased Move (Scenario 3) | 4. EPTM Training with Alt. 1 LU & FP & Phased Move (Scenario 4) |
|---|---|---|---|---|
| Biological Resources-Federal T & E Species | **Significant Impact**<br><br>Obscurant training, TPA grenades and smoke pot training, and planned construction projects result in *may affect* determination for Indiana bat, gray bat and bald eagle (which is classified as a *significant adverse* impact).<br><br>A Biological Opinion has been issued by the USFWS with an incidental take statement in response to the Army's Proposed Action.<br><br>**Mitigation (Conservation Measures):**<br><br>**1. Implementation of Reasonable and Prudent Measures that have been specified by USFWS.** (Based on implementation of RPMs, the USFWS determined that the proposed action will not jeopardize the continued survival of the three federally-listed species.)<br><br>2. Adhere to "project design features" specified as part of the proposed action to minimize impacts.<br><br>3. Prepare Endangered Species Management Plan.<br><br>4. Develop and implement biomonitoring plan (see Vol. III, Appendix K).<br><br>5. Establish bat management zones around Freeman Cave and landscape-scale forest management policy. | **Significant Impact**<br><br>This alternative would be expected to result in a *may affect* impact to T&E Species (which is classified as a *significant adverse* impact).<br><br>However, these impacts would be less than those associated with cumulative impact scenarios 1 and 3 that include OPTM training levels.<br><br>**Mitigation (Conservation Measures):**<br><br>Implementation of this alternative would require formal consultation with USFWS, issuance of a Biological Opinion, and **implementation of Reasonable and Prudent Measures specified by USFWS.**<br><br>The total mitigation requirement would be expected to be somewhat less restrictive than to those defined in detail for Scenario 1. | **Significant Impact**<br><br>The degree of impacts anticipated would be directly comparable to Scenario 1, although the specific locations of these impacts would vary under this alternative.<br><br>**Mitigation (Conservation Measures):**<br><br>Same as Scenario 2. | **Significant Impact**<br><br>Same as Scenario 2.<br><br>**Mitigation (Conservation Measures):**<br><br>**Same as Scenario 2.** |
| Economic Development | Significant Positive Economic Impact to Region. | Significant Positive Economic Impact to Region. No appreciable difference in degree of impact versus Scenario 1. | Same as Scenario 1 | Same as Scenario 2 |

| Table ES.3 - Summary of Significant Impacts and Mitigation Actions for Each Cumulative Impact Scenario * | | | | |
|---|---|---|---|---|
| **Resource Category** | **1. Army's Proposed Training (OPTM) with Army's Proposed LU & FP and Phased Move (Scenario 1)** | **2. EPTM Training with Army's Proposed LU & FP and Phased Move (Scenario 2)** | **3. Army's Proposed Training (OPTM) with Alt. 1 LU & FP & Phased Move (Scenario 3)** | **4. EPTM Training with Alt. 1 LU & FP & Phased Move (Scenario 4)** |
| Note: * In addition to the mitigation measures noted above, FLW will implement or continue to adhere to the following protective measures that address adverse impacts to other resource categories and ensure that impacts of the planned actions are consistent with those predicted in this EIS: 1) Implementation of Project Design Features; 2) Adherence to Best Management Practices; 3) Continuation of Ongoing Resource Management and Restoration Programs; 4) Continued Compliance with Other (Non-BRAC) Permit Requirements; 5) Completion and Implementation of Six BRAC-Related Monitoring Programs (and Associated Adaptive Management Strategies) as described in Vol. III, Appendix K; and 6) Completion and Implementation of the Public Awareness Program as described in Vol. III, Appendix L. | | | | |
| *Source: Harland Bartholomew & Associates, Inc* | | | | |

## ES.7 APPLICABLE LAWS AND PERMIT REQUIREMENTS ASSOCIATED WITH THE ARMY'S PROPOSED ACTION

This EIS has been prepared to identify ongoing and future actions that are required to comply with all applicable Federal and state laws and regulations. Federal laws and executive orders that are particularly relevant to the actions considered in this EIS are listed in Table ES.4. Permits that will be required to implement the Army's Proposed Action (and alternative implementation plans) are discussed in subsections 5.2.2.10 (for training activities), and 5.2.2.10 (for land use and facility construction plans). A summary of the permit requirements associated with the Army's Proposed Action is provided below.

*Therefore, this EIS has analyzed the environmental impacts of fog oil obscurant training based on consumption of 84,500 gallons. If the Army cannot obtain a permit to use 84,500 gallons, the Army will conduct training using the 65,000 gallons currently permitted (MDNR Permit No. 0695-010). The environmental impacts of using 84,500 gallons will exceed the effects of using the 65,000 gallons currently permitted; therefore, the environmental effects of using 65,000 gallons have not been separately analyzed. In no event will fog oil obscurant training be conducted except in accordance with all terms and conditions of any Prevention of Significant Deterioration (PSD) permit granted by the Missouri Department of Natural Resources. This permit process is discussed in more detail in subsection 5.2.2.10.1.*

- **Prevention of Significant Deterioration (PSD) Air Quality Permit.** Due to the quantity of air emissions associated with the planned fog oil obscurant training activities, the action is subject to Prevention of Significant Deterioration (PSD) permit review in compliance with 40 CFR Part 52 and Missouri State Rule 10 CSR 10-6.060 (8)(C). Full implementation of the Army's Proposed Action for fog oil obscurant training requires the use of up to 84,500 gallons of fog oil per year and up to 1,200 gallons per day. Review of subsection 5.5.3.3.2 (and other air quality subsections of the EIS) indicate that full implementation of the Army's Proposed Action would result in exceeding the National Ambient Air Quality Standards (NAAQS) for 24-hour PM-10 (see subsection 5.5.3.3.2 for details). Mitigation is thus required to comply with the NAAQS and the terms of the existing air permit for fog oil training at FLW.

  The cumulative impact analysis included in this Final EIS quantifies the level of mitigation (through reductions in the quantity of fog oil to be used or other sources) necessary to reduce PM-10 air quality impacts to acceptable levels. The Final EIS analysis demonstrates that implementation of the Army's Proposed Action, with fog oil training mitigated to conditions and use limits established

by the current MDNR Air Permit #0695-010, will comply with the National Ambient Air Quality Standards for PM-10 (see Table 5.58).

Because the implementation of fog oil training at the mitigated (existing permit) level does not provide the desired level of training, Fort Leonard Wood intends to pursue a revised air permit with MDNR after evaluating the assumptions used for the model as described in subsection 5.2.2.3.7. The revised permit application may request consideration of approval to use fog oil quantities up to the maximum levels specified under full implementation (non-mitigated) of the Army's Proposed Action (up to 84,500 gallons per year and up to 1,200 gallons per day). Any such permit renewal process will be subject to full public disclosure and comment per the conditions and procedures established by MDNR. Additional details regarding the cumulative impact analysis and other factors relating to the PSD permitting process are fully documented in subsection 5.5.3.3.3.

- **Section 7 Consultation.** As required under Section 7 of the Endangered Species Act (ESA, 1973 as amended), FLW has prepared a Biological Assessment (BA) evaluating effects of the Army's Proposed Action at FLW on Federally-endangered Indiana bats and gray bats and Federally-threatened bald eagles (FLW, 1996h), and entered into formal Section 7 consultation with the Columbia, Missouri Field Office of the U.S. Fish and Wildlife Service (USFWS). In concluding formal consultation, the USFWS issued a Biological Opinion (BO), incidental take statement, terms and conditions, and reasonable and prudent measures on February 4, 1997 (USFWS, 1997). The conservation measures to be implemented by FLW (consistent with the BO) are summarized in Table ES.3 above and discussed in detail in subsection 5.5.3.11.

- **National Pollution Discharge Elimination System (NPDES) Permit.** The release of uncombusted fuels associated with flame field expedient deterrents training and the release of fog oil from obscurant training have been addressed under the revised NPDES Missouri State Operating Permit (Number MO-0117251) which was issued on 4 April 1995. This permit was modified as part of the initial evaluation process. The permit includes requirements for monitoring, and provides effluent limitations for 12 outfalls which address all the potential flame field expedient deterrent and smoke training ranges. Implementation of the Army's Proposed Action will not require further modification of the permit. This permit process is discussed in more detail in subsection 5.2.2.10.2.

- **Nuclear Regulatory Commission (NRC) Materials License.** Implementation of the action would result in the need for an additional NRC Materials License for the management and use of radioactive materials after completing construction of the Chemical School radiological laboratory and associated training areas. This license requirement is discussed in more detail in subsection 5.2.2.10.3.

- **Land Disturbance Storm Water Permit.** FLW will need to obtain a General State Operating Permit to discharge storm water associated with construction-related land disturbance for areas exceeding five acres. This permit would be issued in compliance with the Missouri Clean Water Law (Chapter 644 R.S. as amended) and the Federal Water Pollution Control Act (Public Law 92-500). This type of permit is issued to implement the statewide storm water management program and to reduce the need for an individual NPDES permit for each individual construction action. This permit process is discussed in more detail in subsection 5.3.2.10.1.

- **Nationwide Permit (NWP) per Section 404 of the Clean Water Act (CWA).** Construction activities involving, encroaching on, dredging or filling the waters of the United States require a review and potentially a Section 404 permit. Implementation of the Army's Proposed Action will require a review of compliance with the NWP prior to initiation of the construction phase of the range road stream crossings and facilities near wetlands and stream banks. This permit process and specific facilities that will require additional analysis is described in subsection 5.3.2.10.2.

**Table ES.4:**
**Compliance with Federal Environmental Statutes and Executive Orders for the Proposed Relocation of the Chemical School and Military Police School to FLW**

| Federal Statute or Executive Order | Compliance Status * |
|---|---|
| Archaeological Resources Protection Act | Completed |
| Asbestos Hazardous Emergency Response Act of 1986 (Public Law 99-519) | Ongoing |
| Atomic Energy Act of 1954, as amended | Ongoing |
| Clean Air Act, as amended (Public Law 89-272) | Ongoing |
| Endangered Species Act of 1972, as amended (Public Law 93-205) | Ongoing |
| Energy Reorganization Act of 1974 (Public Law 93-438) | Ongoing |
| Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387) | Ongoing |
| Fish and Wildlife Coordination Act, as amended (16 U.S.C. 136 et. seq.) | Ongoing |
| Migratory Bird Treaty Act of 1918 as amended (Public Law 99-645) | Ongoing |
| National Environmental Policy Act of 1969 (NEPA) (Public Law 91-190) | Ongoing |
| National Historic Preservation Act of 1966, as amended (Public Law 89-665) | Completed |
| Native American Graves Protection and Repatriation Act (Public Law 101-601) | Ongoing |
| Noise Control Act of 1972, as amended (42 U.S.C. 4901 et. seq.) | Ongoing |
| Resource Conservation and Recovery Act (RCRA) (Public Law 94-580) | Ongoing |
| Safe Drinking Water Act (42 U.S.C. 300f-300j-26) | Ongoing |
| Solid Waste Disposal Act (42 U.S.C. 6901 et. seq.) | Ongoing |
| Toxic Substances Control Act (Public Law 94-469) | Ongoing |
| Watershed Protection and Flood Prevention Act (16 U.S.C. 1101, et. seq.) | Ongoing |
| Wetlands Conservation Act (Public Law 101-233) | Ongoing |
| Environmental Justice (Executive Order 12898) | Ongoing |
| Federal Compliance with Pollution Control Standards (Executive Order 12088) | Ongoing |
| Floodplain Management Act (Executive Order 11988, 33 U.S.C. 701-1) | Ongoing |
| Intergovernmental Review of Federal Programs (Executive Order 12372) | Ongoing |
| Protection of Wetlands (Executive Order 11990) | Ongoing |

Notes: * Complete: Have met all statutory requirements associated with Proposed Action.
Ongoing: Most of these regulations require continuation of ongoing compliance activities for FLW to remain in compliance. In some instances, requirements remain to be met prior to implementing proposed BRAC-related actions.

*Source: Harland Bartholomew & Associates, Inc.*

## ES.8 SELECTION OF THE ARMY'S PREFERRED ACTION

In accordance with the President's Council on Environmental Quality regulations (40 CFR 1502.14), this Final EIS identifies the Army's Preferred Alternative for implementing the Proposed Action. The rationale for the selection of a Preferred Action is summarized below.

The impact analysis revealed that the environmental impacts of the Alternative 2 Land Use and Facility Plan (LU&FP) were clearly more adverse than either the Army's Proposed LU&FP or the Alternative 1 LU&FP. Therefore, the Alternative 2 LU&FP was eliminated from further consideration in the "Step 5" cumulative impact analysis. The analysis also showed that the Army's Proposed LU&FP has less overall adverse environmental impacts, and results in considerably higher operational efficiency than the Alternative 1 LU&FP. Therefore, the Army's Proposed LU&FP was favored for selection as part of the overall action implementation plan.

The impact analysis documents that the Relocate Current Practice (RCP) training alternative would result in substantially higher adverse environmental impacts (taken as a whole) than either the Army's Proposed

(OPTM) Alternative, or the EPTM Alternative. Therefore, the RCP Alternative was eliminated from further consideration in the "Step 5" cumulative impact analysis.

The analysis indicates that selection of the EPTM Training Alternative would reduce the annual quantity of fog oil to be used, thereby reducing the extent of impacts on the environment (including some reduction in the degree of impact to air quality and threatened and endangered species). However, significant adverse impacts to both air quality and threatened and endangered species would still occur as a result of the provision under each alternative to use up to 1,200 gallons of fog oil on peak training days; and the nature and extent of mitigation under the OPTM and EPTM alternatives are very similar. However, the implementation of the EPTM Alternative would noticeably reduce the overall training effectiveness in six of the 43 training goals (see subsection 5.2.2.17.1.2).

The most significant reduction in training effectiveness under the EPTM Alternative would be associated with TG 7.4 (Fog Oil Training Field Proficiency Test), where the reduced levels of fog oil usage would not provide soldiers that are as highly trained under realistic field conditions as the OPTM Alternative provides. Furthermore, proficiency in deployment and maintenance of smoke screen cover over specified areas under battlefield conditions is considered to be critically important to successful perform certain military missions, and to protect our troops and defend our national interests and those of our allies.

Based on consideration of these conclusions, in association with all other information presented in the Final EIS, the Army's Preferred Action is defined as:

- implementation of the **Optimum Training Method (OPTM) Alternative** to support activities associated with the Military Police School and the Chemical School;

- implementation of the **Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction)** which includes providing facilities (buildings, specialized training facilities and designated training land areas) to meet the training needs of the Military Police School and the Chemical School, and the needs of additional personnel to be realigned to the installation, through a combination of:
    - reuse or additional use of existing facilities in their present condition;
    - alteration of existing facilities to make them suitable for new uses or activities;
    - construction of new facilities; and
    - rental or purchase of family housing in the local community by individual service members; and

- the **Phased Move** of personnel tied to the availability of facilities.

This Preferred Action is consistent with the actions evaluated under cumulative impact analysis "Scenario 1" as described above. The Preferred Action will be implemented in accordance with the mitigation actions summarized in Table ES.3 above.

## ES.9 MAJOR AREAS OF COMMENT ON THE Draft EIS AND CHANGE IN THE Final EIS

As outlined in the Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR 1503.4(5)(b) dated July 1, 1986) comments received on the draft statement have been attached to this FEIS. Part II of Volume II documents all DEIS review comments and provides responses to all substantive comments. Principal changes that have been made in the FEIS in response to comments on the DEIS are summarized as follows:

- The air quality analysis has been modified and expanded to clarify several issues and to provide additional details concerning the potential impacts of the proposed action on air quality. The additional analysis included dispersion modeling that was applied to quantify cumulative ambient air impacts. This additional information is presented in subsections 5.2.2.3 and 5.5.5.

- Appendix J, Air Permit, has been added to Volume III of the EIS to incorporate the existing fog oil air quality permit into the FEIS. The permit documents training restrictions designed to ensure that National Ambient Air Quality Standards (NAAQS) are maintained. These restrictions are intended to protect human health, air quality, and the environment.

- An *Air Quality Technical Reference Document: Relocation of the US Army Chemical School and US Army Military Police School to Fort Leonard* (COE KC, 1997a) has been developed and included in each of the public repositories listed in subsection 1.4.6.3 to provide supporting documentation for the air quality analysis.

- Appendix K, Summary of Monitoring Programs, has been added to Volume III of the FEIS to document the format and intent of monitoring programs that will be finalized and implemented by FLW to ensure that the impacts associated with implementing the Proposed Action are consistent with those predicted in the EIS and in full compliance with all applicable laws, regulations and permit conditions. Specifically, Appendix K describes monitoring program elements, associated adaptive management strategies, and compliance schedules for six distinct monitoring programs including: 1) Air Quality; 2) Soils and Vegetation; 3) Human Health; 4) Endangered Species; 5) Biological Indicators; and 6) Water Quality monitoring plans.

- Appendix L has been developed to document the Army's commitment to develop and implement a Public Awareness Plan prior to the start of fog oil training at FLW. The intent of the plan is to inform the public in the surrounding community and those living at, working at, or visiting FLW about fog oil obscurant training, and potential health risks associated with exposure to fog oil at various concentrations.

- Subsection 5.2.2.15.A.1 has been expanded to provide additional clarification concerning the existing restrictions and administrative procedures that are in place at FLW to ensure that Ranges and Training Areas are used in a manner to protect the health and safety of both recreational users and military personnel. The subsection also includes a discussion of the additional management restrictions that will be implemented by FLW, regardless of the training alternative selected, in order to ensure protection of human health and safety.

- A *characterization of CDTF decontaminated wastewater and the estimated risk posed by transportation* (FMC, 1997) of these wastes was completed to provide additional information regarding the potential risks associated with the transportation of decontaminated waste by-products associated with operation of the Chemical Defense Training Facility (CDTF). Information from this analysis is summarized in subsection 5.2.2.8.5 and Appendix I.

- Section 7 formal consultation with the US Fish and Wildlife Service (USFWS) as required by the Endangered Species Act (ESA) to determine the potential impacts of the proposed action on Federally-listed threatened or endangered species has been completed. The results of the Biological Opinion (USFWS, 1997), including reasonable and prudent measures to be implemented by FLW to minimize adverse impacts to species of concern has been described in subsection 5.5.

- The cumulative impacts analysis (subsection 5.5) has been restructured and expanded to provide additional information concerning the potential for cumulative impacts associated with the proposed action.

- The discussions in subsection 5.2.4.11 and Appendix F have been expanded to clarify the rationale for the selection of species used as receptors in the Ecological Risk Assessments.

- The discussion in subsection 5.2.2.15.B.2 has been expanded to clarify the potential health concerns associated with the use of grenades and smoke pots. Included in this discussion is information concerning the benefits of using terephthalic acid (TPA) based grenade systems as

compared to hexachlorethane based systems. Additionally, subsection 3.3.3.7 has been expanded to include additional information on the use of these items.

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# Section 1
# PURPOSE, NEED AND SCOPE

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# Section 1: Purpose, Need and Scope

## 1.1 BACKGROUND

The Department of the Army (DA) is reducing its force structure in response to changing global security requirements. These changes result in a need for fewer installations to station the smaller force. As the size of the Army is reduced, activities are being relocated and consolidated to installations that will ultimately provide maximum capability to project and sustain military combat power in support of national military objectives.

The process used to identify installations to be closed, and installations to gain realigned missions, was established in the Defense Base Closure and Realignment Act of 1990 (1990 Base Closure Act), Public Law 101-510. The military services used criteria established by the Secretary of Defense and accepted by Congress, and a force structure plan provided by the Joint Chiefs of Staff, to recommend closure and realignment actions. These criteria considered military value, return on investment from cost savings, environmental features of potential closing and gaining installations, and socioeconomic impacts.

A consolidated Department of Defense (DOD) list of recommended actions was submitted by the Secretary of Defense to the bipartisan Defense Base Closure and Realignment Commission (Commission) on February 28, 1995. The Commission completed their evaluation of the Secretary of Defense's recommendations with two days of public hearings that started on June 22, 1995. The Commission's evaluation consisted of: 13 investigative hearings; 206 fact-finding visits to 167 military installations and activities; 16 regional hearings nationwide; listening to hundreds of members of Congress; and reviewing thousands of letters from citizens throughout the nation. Upon completion of their review, the Commission's recommendations for base realignments and closure (commonly referred to as BRAC 95) were presented to the President on July 1, 1995. The President approved the BRAC 95 recommendations and forwarded them to Congress on July 13, 1995.

The 1990 Base Closure Act stipulated that once forwarded to Congress, the recommendations would be implemented unless Congress disapproved them within 45 Congressional working days. A joint resolution to disapprove the BRAC 95 recommendations did not pass in Congress on September 8, 1995 and no further Congressional action was taken on this issue during the 45-day review period. Consequently, in accordance with the Base Closure and Realignment Act of 1990 (Public Law 101-510), the BRAC 95 recommendations became law on September 28, 1995.

Recommendations of the Commission (made in conformance with Public Law 101-510) require the closing of Fort McClellan and relocation of the U.S. Army Military Police School and the U.S. Army Chemical School to Fort Leonard Wood (FLW), Missouri. Furthermore, the recommendation stated that the Chemical Defense Training Facility (CDTF) will operate at Fort McClellan (FMC) until such time as the

capability to operate a replacement facility at FLW is achieved. In accordance with Public Law 101-501, Section 2904 (10 U.S.C. Section 2687 nt.) the realignment must be completed no later than the end of the six-year period beginning on the date the President transmitted the BRAC report to Congress. The President transmitted the BRAC report to Congress on July 13, 1995; therefore, the realignment must be completed by midnight July 12, 2001.

## 1.2 PURPOSE AND NEED

Pursuant to the National Environmental Policy Act of 1969 (NEPA) and its implementing regulations, the Army has prepared this Environmental Impact Statement (EIS) to address the environmental and socioeconomic impacts of relocating these schools and their related mission activities to FLW. This action is required to comply with the 1990 Base Closure Act and to continue the essential Army functions performed by the Military Police School and Chemical School.

As part of the BRAC 1995 review process the relocation of the Military Police School and Chemical School presents a unique opportunity to maximize the synergism that logically exists between these schools and the U.S. Army Engineer School that currently operates at FLW, thereby establishing a more efficient and effective training organization.

As part of the collocation process, it is anticipated that the U.S. Army Engineer Center and Fort Leonard Wood (USAEC & FLW) command organization will be modified to allow for more efficient support of the new missions. Plans call for the name of the organization to be changed to the U.S. Army Maneuver Support Center and Fort Leonard Wood (MANSCEN & FLW) to more accurately reflect the expanded mission requirements, and consolidation of some activities.

## 1.3 SCOPE AND LIMITATIONS

### 1.3.1 Scope of the Environmental Impact Statement

This EIS evaluates the direct, indirect and cumulative impacts of the mandated relocation of the Military Police School and Chemical School, and associated support functions, to FLW. The majority of installation lands are located in Pulaski County, with additional lands located in Laclede and Texas counties in the south central Missouri Ozarks. Impacts associated with implementation of BRAC 95 actions at FLW are generally expected to be limited to areas within the installation boundaries that include approximately 62,900 acres. However, this EIS evaluates all actions (individually and on a cumulative basis) to determine the potential for and extent of any impacts that may affect surrounding communities and land areas. For example, the area of influence for the socioeconomic analysis conducted in the EIS includes a nine-county area surrounding the installation.

The EIS includes the following major elements:

- Section 1 provides a description of the purpose and need for planned BRAC actions, a discussion of the scope of the EIS and a summary of related public involvement activities.
- Section 2 provides an overview of the mandated BRAC actions to occur at FLW including a statement of the legislative requirement for the action, background information related to the action, and an introduction to each element of the action including *training mission* activities to be realigned to FLW, *facilities* required to support realigned actions, and the associated change in military and civilian *population* to occur at FLW.
- Section 3 provides details regarding the Army's proposed method of implementing BRAC actions at FLW, and alternative implementation concepts to be evaluated in the EIS; and an overview of how these implementation alternatives were developed.

- Section 4 provides a description of the affected baseline environment at FLW prior to the Commission's decision (1995 time-frame); and

- Section 5 provides an analysis and discussion of the environmental and socioeconomic consequences associated with the Army's proposed implementation action and related alternatives. Section 5 also documents Army commitments designed to mitigate impacts related to the Army's proposed action.

### 1.3.2 Environmental Impact Statement Scope Limitations

**1.3.2.1 Provisions of 1990 Base Closure Act.** The 1990 Base Closure Act exempts the decision-making processes of the Commission from the provisions of NEPA. The law also relieves the DOD from the NEPA requirement to consider the need for closing, realigning or transferring functions, and from looking at alternative installations to close or realign. However, the Army must still prepare environmental impact analyses to evaluate the process of property disposal; and the process of relocating functions from an installation which is being closed or realigned to another military installation. These analyses must be completed after the receiving installation has been selected, but before the functions are relocated. The impacts of the disposal and reuse of property at FMC will be evaluated in a separate EIS in accordance with Army policy for analysis of BRAC actions. Therefore, this EIS is limited to an analysis of alternative methods of implementing the Military Police School and Chemical School missions at FLW, Missouri.

**1.3.2.2 Changing Mission Requirements.** This EIS identifies and evaluates the Military Police and Chemical schools mission activities, and their supporting activities as required by the BRAC Commission's recommendations, as they existed at FMC at the time base data was collected (late 1995 - early 1996 time-frame). These mission activities were identified based on a detailed review of all current programs of instruction (POIs) that define the training activities of each school, site visits to FMC to observe current training activities, and extensive interviews with Chemical School and Military Police School representatives to ensure that the EIS has captured and defined the full range of activities to be considered for implementation at FLW.

However, it should be noted that specific training activities for these schools (and all other DOD elements) are subject to continuous evaluation and change. Changes may occur in response to a variety of influencing factors including new technologies, teaching methods, mission assignments, national defense requirements and the number of students to be trained. If changes in the proposed BRAC actions occur, they will be reviewed by Army environmental staff to determine if there is a need for additional environmental documentation which could be developed as an environmental assessment (EA), EIS or record of environmental consideration (REC). This EIS will serve as a primary source document that can be used to support any supplemental studies that may be required. Any new or additional mission will be evaluated in compliance with all Federal, state and local laws and regulations prior to deciding to implement these actions at FLW. Furthermore, the public will be fully informed of any major new actions that may be considered for future implementation at FLW as a normal part of the NEPA compliance process.

**1.3.2.3 Changing Regulatory Requirements.** On November 27, 1996, the United States Environmental Protection Agency (USEPA) announced a proposal for two new regulations regarding the National Ambient Air Quality Standards (NAAQS), one for ozone and one for particulate matter. The proposal for particulate matter includes adding a category of 2.5 microns of less (PM 2.5) to the current category of 10 microns or less (PM 10). The USEPA is under a court order to issue a final rule making for particulate matter by June 28, 1997. They intend to follow the same schedule for the ozone standard. The open comment period for these proposed regulations was originally to last until February 18, 1997, but the comment period has been extended another 60 days. The USEPA proposes implementation of these new standards in 1998, assuming they are adopted by June 1997. The FEIS has not evaluated these proposed standards during the analysis because they are proposed, not final regulations. They are subject to change based on public comments. If these new regulations are implemented, the Army will comply with all applicable Federal and state regulations and laws that may result.

## 1.4 PUBLIC INVOLVEMENT

The EIS process is designed to involve the public in Federal decision-making. Steps taken to ensure that the public has the opportunity to participate in the EIS for the BRAC actions to occur at FLW are listed below and described in the subsections 1.4.1 through 1.4.14

- Notice of Intent
- Project Mailing List
- Agency Coordination Workshops
- Town Hall Meetings
- Scoping Process
- Scoping Results
- EIS Newsletters
- Special Interest Group Meetings
- Draft Environmental Impact Statement (DEIS)
- Public Review and Comment Period
- Public Hearing
- Final Environmental Impact Statement (FEIS)
- Waiting Period
- Record of Decision (ROD)

### 1.4.1 Notice of Intent

The public was initially notified of the U.S. Army's intent to prepare this EIS through the publication of a notice of intent (NOI) in the September 22, 1995 issue of the *Federal Register.* This NOI included all actions to be evaluated by the Army in association with the 1995 Commission's recommendations. A copy of the NOI has been included in Volume III, Appendix A (subsection A.4).

### 1.4.2 Project Mailing List

An initial project mailing list was developed to serve as a starting point for communication with the public. The initial list included over 600 names and included members of the general public who had expressed interest in prior environmental documents prepared by FLW; special interest groups; Federal, state and local agencies and elected officials; public repositories (libraries); and regional, state and local media outlets (television, radio and newspaper). This list was maintained and updated throughout the EIS process and any additional individuals or organizations that expressed interest in the process were added to the list. The mailing list was used to distribute project notices and information throughout the EIS process.

### 1.4.3 Agency Coordination Workshops

A series of Agency Coordination Workshops was initiated during the early stages of the EIS process to encourage an open dialogue between the EIS project team and key review agencies. Agencies participating in these workshops include the U.S. Fish and Wildlife Service (USFWS), the U.S. Environmental Protection Agency (USEPA), the U.S. Forest Service, the Agency for Toxic Substances and Disease Registry, the Missouri Department of Conservation (MDC), the Missouri Department of Natural Resources (MDNR), the U.S. Natural Resources Conservation Service (previously the U.S. Soil Conservation Service), the U.S. Army Corps of Engineers - Kansas City District, and FLW environmental staff. These agency workshops were designed to keep these agencies informed of the direction and development of the EIS; and to solicit their input to help identify key study issues, formulate EIS alternatives and develop impact analysis methods. A total of eight agency workshops were held prior to publication of the DEIS. Additional meetings have been held with individual agencies to discuss their comments on the DEIS. It is anticipated that agency coordination will continue through the preparation of the FEIS and ROD.

**1.4.3.1 Cooperating Agency - U.S. Fish and Wildlife Service.** The USFWS participated in the EIS process as a cooperating agency. As stated in their letter included in Appendix A (page A-23), the USFWS has been working closely with FLW for over two years, with emphasis on biological assessment studies designed to protect Federally-listed threatened and endangered species (T & E Species) that are known to occur at the installation. As a cooperating agency, the USFWS assisted the Army in the preparation of the scope of work for the Biological Assessment (BA) of planned Chemical School and Military Police School activities, and identification of study issues as part of the EIS scoping process. The USFWS also reviewed and provided comments on early working drafts of the BA and EIS. The specific terms of the cooperative agreement between FLW and the USFWS are described in a letter of agreement (LOA) which has been included in Volume III, Appendix A (subsection A.5).

### 1.4.4 Town Hall Meetings

The public was invited to attend several town hall meetings held by the Army in communities around FLW prior to the formal public scoping meeting (see subsection 1.4.5 below) to more fully inform the public of BRAC actions to occur at the installation. An additional series of town hall meetings was conducted in the June/July 1996 timeframe to help keep citizens informed of the status of planning activities associated with the planned relocation of the Chemical School and Military Police School to FLW.

### 1.4.5 Scoping Process

The public scoping process solicits public and agency participation to assist in identifying critical issues to be addressed in the EIS. All persons thought to have a potential interest in the planned action, including minority, low income, disadvantaged and Native American groups, were informed and given the opportunity to participate in the decision-making process. A legal notice was prepared to announce the Army's intent to conduct a public scoping meeting to discuss issues relating to the preparation of an EIS for the relocation of the Military Police School and Chemical School to FLW. This legal notice was published in the November 10 through 16, 1995 editions of the *St. Louis Post-Dispatch*; the November 10 through 16, 1995 editions of *The Kansas City Star*; the November 10 through 16, 1995 editions of the *Rolla Daily News*; the November 10,13 through 17 and 20, 1995 editions of the *Daily Fort Gateway Guide* in Pulaski County, Missouri; the November 9, 16 and 23, 1995 editions of the *Houston Herald and Republican* in Houston and Texas counties, Missouri; and the November 10 through 16, 1995 editions of *The Anniston Star* in Anniston, Alabama. In addition, notification of the public scoping meeting was distributed to over 100 regional and local radio stations, and three television stations.

Scoping letters or scoping meeting notices were mailed to public agencies, special interest groups and organizations, political representatives and individuals known or thought to have an interest in the project. These announcements included a summary statement of the planned action, a description of the purpose of the public scoping meeting and an invitation to attend the meeting and/or submit written comments identifying any key issues that should be considered in the EIS. More than 600 notices were mailed approximately three weeks prior to the scheduled meeting.

The public scoping meeting was conducted using an open house format at the Waynesville High School, from 4:30 to 8:30 p.m. on November 30, 1995. An informational flyer, comment sheet and registration card were provided to all meeting participants as they entered. Participants were then encouraged to view a video presentation that provided an overview of the planned action, the EIS process and the purpose and format of the scoping meeting. Participants were then directed to an open meeting room where they could review additional graphic and narrative information regarding FLW, the EIS process and the planned action. Numerous EIS study team representatives were available to meet with participants to answer questions and discuss issues of concern. Registration cards were completed by 138 individuals, with total attendance exceeding 150 persons.

All meeting participants were encouraged to provide written comments regarding the planned action (using the standard comment sheets provided or any other form of written comment). In addition, a court recorder was available at the meeting for any person who preferred to provide their scoping comments

verbally. During the meeting, the public was informed that all comments, both verbal and written, would be considered. This included all comments received at the scoping meeting and all written comments received after the meeting, prior to February 15, 1996, that addressed scoping issues. Army representatives stated that the public will be informed of the availability of the DEIS and FEIS, and will be afforded the opportunity to review and comment on these documents.

### 1.4.6 Scoping Results

**1.4.6.1 Responses Received**. The Army received 191 responses including 182 written and 9 provided to the scoping meeting court recorder. This included comments received prior to, during and through the close of the scoping comment period. The majority of responses were from individuals. In addition, responses were received from the following organizations and agencies:

**Federal Agencies**

- U.S. Department of Transportation, Federal Railroad Administration
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

**State Agencies**

- State of Missouri Clearinghouse - Office of Administration
- Missouri Department of Conservation
- Missouri Department of Natural Resources
- Missouri Highway and Transportation Department, District 9

**Local/Regional Government and Organizations:**

- City of Crocker, Mayor's Office
- City of Dixon, Mayor's Office
- City of Eldon Chamber of Commerce
- City of Houston, Mayor's Office
- City of Licking, Mayor's Office
- City of Waynesville, Mayor and City Administrator
- Meramec Regional Planning Commission
- South Central Ozark Council of Governments
- Lake of the Ozarks Area Chamber of Commerce
- Rolla Chamber of Commerce
- Waynesville - St. Robert Area Chamber of Commerce

**Special Interest Groups:**

- Missouri Coalition for the Environment
- Ozark Chapter/Sierra Club

**1.4.6.2 Analysis and Use of Scoping Input.** Comments from each individual or organization were reviewed and marked to identify each type of issue identified. For example, the first comment letter may have included comments related to air quality and biological resources, and therefore was marked to identify these issue headings. Based on this review, it was determined that the issues raised could be assigned to one of the following group or topic headings:

- Air Quality,
- Water Resources,
- Soils and Geology,
- Hazardous Materials,

- Permitting,
- Biological Resources,
- Social and Economic Resources,
- Community Facilities, or
- Training Value.

All comments were organized under the nine headings listed above and a composite document was prepared to allow EIS team members to focus on issues relating to their particular area of expertise and responsibility. The results of the scoping process were presented and discussed at one of the ongoing Agency Coordination Workshops (see subsection 1.4.3 above) to familiarize review agencies with the range and type of issues identified. In addition, a two-day workshop was conducted with EIS study team staff to review all comments and ensure that the EIS methodology was structured to address pertinent issues identified through the scoping process.

Of the 191 responses, 155 expressed support of the realignment action and noted positive benefits. Of the remaining 36 responses, 14 focused on a single issue such as chemicals to be used, groundwater contamination, biological resources or simple acknowledgement of receipt of a scoping notice. Multiple environmental concerns were noted by 22 persons or organizations that provided scoping responses.

A copy of handout materials that were available at the scoping meeting and agency comment letters have been included in Volume III, Appendix A (subsection A.3) of the EIS. Copies of all scoping comments received (agencies, organizations and individuals) have been included in a separate document titled: *Environmental Impact Scoping Report, Relocation of U.S. Army Chemical School and U.S. Army Military Police School to FLW, Missouri.* A copy of this document, along with other supporting appendices, is available at the information repositories described in the following subsection.

**1.4.6.3 Information Repositories**. Copies of this FEIS (Volumes I through IV), copies of all comments received during the scoping process, and supporting studies as listed in subsection 1.5 are located at the following repositories. Copies of the DEIS along with the scoping report and associated supporting studies where placed in nine of these eleven repositories. The Daniel Boone Regional Library in Columbia, MO and the Missouri River Regional Library in Jefferson City, MO were added to the list of repositories based upon the geographic location of individuals and groups that provided comments on the DEIS.

Clarke Engineer School Library
3202 Nebraska Avenue
Ft. Leonard Wood, Missouri 65473

Attn: Ms. Claretta Crawford
Tel: (573) 563-4109

Daniel Boone Regional Library
100 Wet Broadway
Columbia, MO 65203

Attn: Ms. Marilyn McCloud
Tel: (573) 443-3161

Fisher Library
U.S. Army Chemical School
Fifth Avenue, Building 1081
Fort McClellan, Alabama 36205-5020

Attn: Mr. Richard Pastorett
Tel: (205) 848-4414

Kansas City Public Library
311 East 12th Street
Kansas City, Missouri 64106

Attn: Ms. Teresa Stoh
Public Relations, Marketing Dept.
Tel: (816) 221-2685

Kinderhook Regional Library
Historic 66 West
Waynesville, Missouri 65581

Attn: Ms. Margaret Oedewaldt
Tel: (573) 774-2965

Kinderhook Regional Library
135 Harwood Avenue
Lebanon, Missouri 65536

Attn: Ms. Emma Henderson
Tel: (417) 532-2148

Missouri River Regional Library
214 Adams
Jefferson City, MO 65101

Attn: Mr. Eric Austin
Tel: (573) 634-2464

Rolla Public Library
900 Pine Street
Rolla, Missouri 65401

Attn: Ms Cheryl Goltz
Tel: (573) 364-2604

St. Louis County Library
Main Branch, 1640 South Lindbergh
St. Louis, Missouri 63131

Attn: Ms. Lynn Silence
Tel: (314) 994-3300

Shepard Room
Springfield-Greene County Library
397 East Central Street
Springfield, Missouri 65802

Attn: Mr. Michael Glenn
Phone: (417) 837-5000 extension 33

Texas County Library
117 West Walnut Street
Houston, Missouri 65483

Attn: Ms. Penny Hamilton
Tel: (417) 967-2258

**1.4.6.4 Summary of Major Scoping Issues Identified.** The following paragraphs provide a summary of issues identified in the context of the nine group headings listed above.

- **Air Quality**. Approximately 70 comments were received addressing air quality issues associated with the planned actions. Over 85 percent of these comments involved questions and concerns relating to the construction of a thermal treatment unit which was being considered by the Army to dispose of non-hazardous materials generated by the planned CDTF. About 10 percent of the air quality comments were related to potential air quality impacts associated with planned "fog oil" training (see Appendix B, subsection B.2.12.6.8 for discussion of fog oil training). The remaining comments were related to potential air quality impacts associated with the planned use of biological agents and flame field expedient (FFE) deterrents training associated with Chemical School training activities.

- **Water Resources**. Approximately 30 comments were received addressing water quality and aquatic resources. Concerns identified were primarily related to the potential impact of fog oil training to surface and groundwater resources.

- **Soils and Geology**. Approximately 10 comments expressed concern relating to the relationship of soil resources and geologic conditions within the FLW area to the use of fog oil during training. These comments included concerns regarding the potential for contamination of soils in and around the installation; numerous references to the karst (sinkhole) features that are known to occur in the region and the potential for these karst features to contribute to deterioration of local and regional water supplies.

- **Hazardous Materials**. Approximately 120 comments addressed issues relating to the transportation, storage, use and disposal of hazardous materials associated with planned realignment actions. The most commonly referenced issues under this category are summarized below:

    - Chemical characteristics of fog oil (both prior to and after it is used in fog oil obscurant generators);
    - Potential health effects of fog oil training and other training on soldiers, instructors and area residents;
    - Potential hazards of shipping materials from FMC, Alabama to FLW, Missouri;
    - Evaluation of the Army's Spill Prevention and Response Plan at FLW;
    - Potential impacts of the accidental release of, or exposure to, hazardous and radiological materials associated with the new training missions;
    - Steps that will be taken to monitor the environment to ensure that the use of new materials does not result in adverse impacts; and
    - Procedures to be used to decontaminate and dispose of materials used in the Chemical Defense Training Facility.

- **Permitting**. Approximately 30 comments related to various permitting issues that could be required to conduct planned chemical and military police training activities at FLW. Most of these comments were related to the permitting process associated with fog oil obscurant training. Several reviewers suggested specific amendments to the existing and future permits for fog oil obscurant training. Comments were also provided regarding other types of permits that should be considered as part of the EIS process.

- **Biological Resources**. Approximately 100 comments addressed potential impacts to biological resources that exist within and around FLW. The majority of these comments were associated with planned fog oil training activities. Concerns focused on Federally-listed threatened and endangered species, state-listed species, and general wildlife populations and vegetation within the area. These comments included specific references to fish species, insects, amphibians, reptiles and birds (including neotropical migrants).

- **Social and Economic Resources**. Approximately 110 comments addressed the relationship of planned BRAC actions to social and economic resources within the FLW area and a large region around the installation. Most of these comments stressed the positive relationship of FLW operations to the local and regional economy, and the potential for the planned actions to stimulate long-term development and business sector growth. Some comments requested consideration of any negative impacts that the relocation of the schools might have on the economy as a result of concerns associated with the type and extent of training activities to occur and the impact of the planned actions on population projections and infrastructure requirements within the region.

- **Community Facilities**. Approximately 10 comments addressed concerns regarding the ability of surrounding communities to deal with the growth that might occur as a result of the planned action. These concerns included the potential need for detailed land use planning and zoning, the availability of area housing, and potential impacts to area schools, roadways and utility systems.

- **Training Value**. Approximately 13 comments dealt with issues relating to enhanced training values that could accrue to the nation and the Army as a result of the planned consolidation of the Chemical School, Engineer School and Military Police School at FLW. These comments suggested that base realignment and closure is a practical and cost-effective way to streamline military activities; that taxpayers will benefit from the consolidation of activities at FLW; and that the collocation of these schools will have a positive impact on the quality of training that can be provided by combining these schools at one location, since they work together on the battlefield.

**1.4.6.5 Issues Identified but Beyond the Scope of the Environmental Impact Statement.** Several issues were identified in the scoping process comments that are beyond the scope of this EIS. The comments and reason why they are not considered are as follows:

- **Issue - FLW Incinerator Construction**

  Comment: If additional incinerators were to be installed at FLW in the future, would adherence to the Missouri air conservation permitting process be required?

  Response: There is no identified need for incinerators beyond consideration of a thermal treatment unit associated with the CDTF. Based on analyses conducted in the development of this EIS, the Army's proposed action for disposal of decontaminated wastes generated as a by-product of training at the CDTF involves off-post disposal versus construction of an on-site thermal treatment unit. If additional needs are identified at some future date, the Army will comply with all applicable Federal and state permitting regulations and laws.

- **Issue - Material Safety Data Sheets**

  Comment: May I see the Material Safety Data Sheets (MSDS) on each of the chemicals that will be used or released?

  Response: Where MSDS information was available it has been used during the analysis of impacts of the proposed actions. Summary data from the MSDS used as part of the analysis for the environmental consequences is presented in Volume III, Appendix B. The complete MSDS files are extensive, but they may be reviewed by contacting the FLW BRAC Transition office.

- **Issue - Fort McClellan Environmental Restoration Costs**

  Comment: What will be the economic cost for the clean up at FMC be for the Chemical Defense Training Facility?

  Response: Clean up costs for the CDTF at FMC are not part of this analysis. Those costs will be evaluated and identified as part of the base cleanup studies for FMC. A summary of the FMC base cleanup study process will be provided in a separate EIS to be prepared by the Army for the Disposal and Reuse of FMC.

- **Issue - Use of Graphite Powder**

  Comment: As part of a longer question, of which parts will be addressed in this EIS, the respondent questioned the potential for use of graphite powder in obscurant training activities.

  Response: The Army intends to use graphite powder on the battlefield as an obscurant because of its capabilities to block certain target detection systems and protect our military personnel. However, the use of graphite as an obscurant during training is still in the developmental stage. Programs of Instruction for graphite use have not been developed or tested, and it is anticipated that it will take approximately 2 to 4 years for the Chemical School to complete steps that are required to incorporate graphite into their training program at FLW. This time is required to identify requirements, develop procedures, conduct field trials and finalize the training program for graphite deployment. Because this training activity is not fully defined at FLW, it is not possible to develop realistic training alternatives or to conduct a meaningful analysis in this EIS. A complete environmental review will be required in compliance with all Federal and state laws and regulations prior to initiating training with graphite obscurants at FLW once the training requirements, procedures and training program are developed. Graphite obscurant training will also require a MDNR-approved modification of FLW's air emissions permit, or a new permit, before training can begin. Furthermore, any such analysis of graphite obscurant use will be

evaluated in association with other activities conducted at FLW to ensure consideration of the cumulative impact of all related actions.

- **Issue - Chemical Weapons Convention**

  Comment: As part of a longer question, of which parts will be addressed in this EIS, the respondent questioned the impact of the Chemical Weapons Convention on this proposed relocation.

  Response: The Chemical Weapons Convention recognizes the need to train personnel in the location, identification and decontamination of nuclear, biological and chemical agents that might be encountered; and to establish and maintain proficiency with defensive measures required to protect civilian and military personnel and equipment from these types of weapons. The training facilities that will be constructed at FLW (including the CDTF) will be used to train personnel in these authorized areas. The new facilities at FLW will replace similar facilities at FMC that are authorized under the terms of the currently non-ratified Chemical Weapons Convention. The existing facilities at FMC will be deactivated when the new facilities at FLW become operational, thereby ensuring that the United States will remain in compliance with the convention.

- **Issue - Use of Hexachloroethane Obscurants**

  Comment: As part of a concern about the health effects associated with using obscurants, the respondent questioned the impact that the increased use of hexachloroethane-based obscurant smoke pots and smoke grenade systems would have on the health of humans, fish and wildlife in the surrounding community.

  Response: The Army is currently in the process of converting all hexachloroethane-based obscurant smoke pot and smoke grenade systems used in training to systems that use terephthalic acid. This conversion will be completed prior to initiating training operations at FLW, and was completed for existing training activities at FLW during November 1996. The Army is implementing this conversion to avoid potential health concerns involving the use of hexacholorethane-based obscurant systems. Consequently, this EIS will not evaluate the effects of hexachloroethane-based obscurant smoke pots and smoke grenade systems. This EIS does consider the health and environmental effects of using the terephthalic acid-based obscurant smoke pot and smoke grenade systems which will replace the current systems.

- **Issue - Use of Non-Petroleum Based Obscurant Fog Oil**

  Comment: As part of a concern about the environmental and health effects associated with using petroleum based fog oil in obscurant training, the respondent questioned if other oils which are less toxic or have fewer environmental consequences could be used.

  Response: The Army currently uses a petroleum based obscurant fog oil. Fog oils manufactured before 1986 typically had high concentrations of toxic and carcinogenic aromatics (Katz, 1980), and posed a potential health threat to exposed individuals. In 1986, military specifications for SGF-2, were altered to require the removal of carcinogens and potential carcinogens from the oil (DA, 1986a). Fog oil used at FLW will, at a minimum, comply with a newer specification (DA, 1995a) which requires manufacturers to test the oils they produce and certify that they show no evidence of carcinogenicity.

  Additionally, the EIS considered the potential for the use of non-petroleum based oils (such as vegetable oils). At the present time the use of these types of oils has not been determined to be practicable. Initial investigations have indicated that it may be possible to use non-petroleum based fog oil for training. The Army is reviewing the potential for the use of non-petroleum based fog oil. It is estimated that it may take 3 to 5 years for the Army to complete additional studies

required to determine the effectiveness of non-petroleum oils in producing obscurant; to review potential maintenance impacts of using these oils on the obscurant equipment; the implications of using non-petroleum products during cold weather; potential implications of long-term storage of non-petroleum products; and the potential environmental impacts of using non-petroleum oils at FLW. Because these issues are not fully defined at FLW, it is not possible to develop a meaningful analysis in this EIS at this point. If after further review the use of non-petroleum based oils appears to be viable and reasonable, the Army will complete an environmental review in compliance with all Federal and state laws and regulations prior to initiating training with non-petroleum based oils at FLW. The use of non-petroleum based oils may also require a MDNR-approved modification of FLW's air emissions permit, or a new permit, before training with any alternative form of oil could begin. Furthermore, any such analysis of non-petroleum based obscurant use will be evaluated in association with other activities conducted at FLW to ensure consideration of the cumulative impact of all related actions.

### 1.4.7 EIS Newsletters

Newsletters were prepared and distributed to all persons on the EIS mailing list to help keep the public informed. Newsletter No. 1 was issued in April 1996 to provide a summary of EIS progress to date, a summary of the scoping process and results, and other pertinent information. Newsletter No. 2 was distributed in June/July 1996 to provide additional information including adjustments that had been made in the definition of the Army's proposed action as a result of the alternatives formulation process. Copies of these newsletters have been included in Volume III, Appendix A (subsection A.6). A third newsletter is scheduled for release approximately one month after the close of the DEIS comment period to provide the public with a summary of the results of the hearing and plans for completion of the FEIS.

### 1.4.8 Special Interest Group Meetings

The Army invited representatives from 17 special interest groups that had expressed interest in the proposed action to meet with EIS study team representatives to exchange information regarding details of the planned action, the alternatives to be evaluated in the EIS and other areas of concern. Groups that were invited to this meeting (via certified mail notice or personal phone contact) included:

- American Fisheries Society, Missouri Chapter
- Audubon Society of Missouri
- Audubon-Burroughs Nature Club
- Confluence, Columbia
- Conservation Federation of Missouri
- Federal Land Action Group
- Heartwood
- Missouri Association of Soil and Water Conservation Districts
- Missouri Coalition for the Environment
- Missouri Heritage Trust
- Missouri Speleological Survey
- PEER
- Student Environmental Action Coalition
- Sierra Club, Ozark Chapter
- Sierra Club, St. Louis
- The Nature Conservancy of Missouri
- Wildlife Society, Missouri Chapter

The first special interest group meeting was held in Jefferson City, Missouri on the evening of June 20, 1996. Groups that participated included the Ozark Chapter of the Sierra Club and the Student Environmental Action Coalition. A total of five representatives from these two groups and two concerned citizens with no specific group affiliation participated in this meeting. The meeting was initiated by providing an overview of the EIS alternatives formulation process, a summary of issues identified during

the scoping process, key technical studies being prepared to support the EIS, and some of the initial study results. The floor was then opened for comments, questions and discussion. The results of the meeting were used by the EIS study team to help ensure that issues of concern were addressed in the EIS.

A second special interest group meeting was held in Jefferson City, Missouri on the evening of November 6, 1996. Groups that participated included the Ozark Chapter of the Sierra Club, Heartwood, and the Conservation Federation of Missouri. A total of four representatives from these three groups participated in this meeting. The meeting was intended to provide assistance to representatives of concerned citizen groups concerning the format and findings of the DEIS, and to discuss their concerns with the DEIS prior to the open house and public hearing.

### 1.4.9 Draft Environmental Impact Statement (DEIS)

A notice of availability (NOA) was published in the *Federal Register* to inform the public that the DEIS had been released. A similar notice was also placed in the legal section of local newspapers, and the major newspapers in the St. Louis, Missouri; Kansas City, Missouri; and Anniston, Alabama regions (see subsection 1.4.5 for list of specific newspapers). These notices identified a point of contact to obtain more information regarding the EIS process, and several public libraries where the DEIS and key supporting studies could be reviewed (see subsection 1.4.6.3). A 45-calendar-day review period (starting with the publication of the NOA in the *Federal Register*) was established to provide all agencies, organizations and individuals with the opportunity to comment on the DEIS.

### 1.4.10 Public Review and Comment Period

Release of the DEIS marked the start a 45-day public review and comment period. Comments received during this period were considered in the development of the FEIS and will be considered by the Decision Maker prior to the development of the Record of Decision. Part II of Volume II of the EIS provides a copy of all written comments received during the Comment Period. Substantive issues raised by each commentor have been identified and numbered. The response to each substantive comment is also documented in Part II of Volume II, including references to sections of the FEIS that have been revised or expanded to address issues raised. Subsection 1.6 below summarizes major areas of comment and additional information that has been included in the FEIS to address these concerns.

A listing of comments received after the close of the public comment period is being maintained, and will be forwarded along with the FEIS to the Decision Maker for consideration in the development and publication of the Record of Decision.

### 1.4.11 Public Hearing

An open house and public hearing was held at the Waynesville High School on November 14, 1996, during the public review and comment period.

- The open house was held between 4:00 p.m. and 6:30 p.m. to provide the public with an opportunity to review display boards that summarized: the Proposed Action; alternative formulation process; and impacts associated with the Army's Proposed Action. In addition, copies of the DEIS and supporting studies were available for review, and Army representatives were available to help answer any questions regarding the DEIS process and results.

- The public hearing was called to order at 7:00 p.m. and provided an opportunity for all interested parties to present oral comments on the DEIS.

Written and oral comments received at the open house and public hearing were considered, along with all other written comments received during the 45-day comment period, in the development of the FEIS.

### 1.4.12 Final Environmental Impact Statement (FEIS)

The Army and EIS study team considered all comments received during the public review and comment period and during the public hearing. A copy of the transcript from the public hearing, all written comments received during the open house and the public hearing, and responses to all substantive comments have been provided in Part II of Volume II of the EIS. Subsection 1.6 below provides additional information regarding major areas of comment and how these comments have been addressed in the FEIS. The publication of a Notice of Availability (NOA) in the *Federal Register* will initiate a 30-day waiting period prior to the completion of a Record of Decision. The FEIS and supporting documents are available for review at each of the eleven repositories identified in subsection 1.4.6.3.

### 1.4.13 Waiting Period

Following publication of the NOA, the Army will wait 30 days before completing and publishing the Record of Decision pursuant to 40 CFR 1506.10.

### 1.4.14 Record of Decision (ROD)

Following a 30-day waiting period from the publication date of the NOA, a ROD will be completed by the Army and published in the *Federal Register.* Comments received during the FEIS 30-day waiting period will be considered by the Army Decision Maker in reaching the final decision on this action. Publication of the ROD is the final step in the NEPA process. The ROD will describe the Army's decision regarding the implementation of the planned Military Police School and Chemical School missions at FLW and the rationale associated with the decision. The ROD will also describe actions to be taken by the Army to reduce or mitigate any significant adverse impacts.

## 1.5 IMPACT ANALYSIS PERFORMED

An interdisciplinary team of planners, engineers, landscape architects, natural and cultural resource specialists, ecologists, economists, demographers, scientists and military specialists have analyzed the proposed action (see Section 2), in the context of the alternatives defined in Section 3. Section 4 provides a discussion of existing or "baseline" environmental and socioeconomic conditions at FLW (1994/early 1995 time-frame, prior to the BRAC 95 decision). Relevant beneficial and adverse effects associated with each alternative are described in Section 5.0. Impacts have been identified in consideration of the degree of change from existing baseline conditions and have considered direct, indirect and cumulative effects as applicable.

Several supporting studies have been prepared to help define the impacts of BRAC actions. These studies have included:

1. A Human Health Risk Assessment which evaluated the impacts of fog oil exposure on humans. Conclusions in the health risk assessment were based, in part, on the results of extensive chemical analyses of the specific fog oil (in both oil and "smoke" form) to be used at FLW. The results of these chemical analyses are included as an appendix to the health risk assessment.

2. A Biological Assessment (BA) to define the impacts of planned actions on Federally-listed threatened and endangered species known to inhabit FLW pursuant to the Endangered Species Act.

3. An Ecological Risk Assessment of the effect of planned activities on Federally-listed threatened and endangered species.

4. An Ecological Risk Assessment of the effect of fog oil on selected amphibians, reptiles, and birds at FLW.

5. Laboratory testing of physical and biological samples from FMC to help determine the potential long-term impacts of fog oil training on the environment.

6. An Air Quality Technical Reference Document which includes additional information concerning the modeling performed as part of the air quality analysis.

7. A characterization of Chemical Defense Training Facility (CDTF) decontaminated wastewater and the estimated risk posed by transportation.

## 1.6 MAJOR AREAS OF COMMENT ON THE DEIS AND CHANGE IN THE FEIS

As outlined in the Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR 1503.4(5)(b) dated July 1, 1986) comments received on the draft statement have been attached to this FEIS. Part II of Volume II documents all DEIS review comments and provides responses to all substantive comments. As noted in Volume II, comments could be organized into one of four categories:

1) Comments that were noted (no additional response required) and that will be forwarded to the Decision Maker for consideration;
2) Comments that required clarification of text and information that was provided in the DEIS;
3) Comments that required the expansion of DEIS text in order to fully address the issue(s) raised; and
4) Comments that warranted additional analysis and incorporation of results and conclusions in the FEIS.

Principal changes that have been made in the FEIS in response to comments on the DEIS are summarized as follows:

- The air quality analysis has been modified and expanded to clarify several issues and to provide additional details concerning the potential impacts of the proposed action on air quality. The additional analysis included dispersion modeling that was applied to quantify cumulative ambient air impacts. This additional information is presented in subsections 5.2.2.3 and 5.5.5.

- Appendix J, Air Permit, has been added to Volume III of the EIS to incorporate the existing fog oil air quality permit into the FEIS. The permit documents training restrictions designed to ensure that National Ambient Air Quality Standards (NAAQS) are maintained. These restrictions are intended to protect human health, air quality, and the environment.

- An *Air Quality Technical Reference Document: Relocation of the US Army Chemical School and US Army Military Police School to Fort Leonard* (COE KC, 1997a) has been developed (and included in each of the public repositories listed in subsection 1.4.6.3 to provide supporting documentation for the air quality analysis.

- Appendix K, Summary of Monitoring Programs, has been added to Volume III of the FEIS to document the format and intent of monitoring programs that will be finalized and implemented by FLW to ensure that the impacts associated with implementing the Proposed Action are consistent with those predicted in the EIS and in full compliance with all applicable laws, regulations and permit conditions. Specifically, Appendix K describes monitoring program elements, associated adaptive management strategies, and compliance schedules for six distinct monitoring programs including: 1) Air Quality; 2) Soils and Vegetation; 3) Human Health; 4) Endangered Species; 5) Biological Indicators; and 6) Water Quality monitoring plans.

- Appendix L has been developed to document the Army's commitment to develop and implement a Public Awareness Plan prior to the start of fog oil training at FLW. The intent of the plan is to inform the public in the surrounding community and those living at, working at, or visiting FLW

about fog oil obscurant training, and potential health risks associated with exposure to fog oil at various concentrations.

- Subsection 5.2.2.15.A.1 has been expanded to provide additional clarification concerning the existing restrictions and administrative procedures that are in place at FLW to ensure that Ranges and Training Areas are used in a manner to protect the health and safety of both recreational users and military personnel. The subsection also includes a discussion of the additional management restrictions that will be implemented by FLW, regardless of the training alternative selected, in order to ensure protection of human health and safety.

- A *characterization of CDTF decontaminated wastewater and the estimated risk posed by transportation* (FMC, 1997) of these wastes was completed to provide additional information regarding the potential risks associated with the transportation of decontaminated waste by-products associated with operation of the Chemical Defense Training Facility (CDTF). Information from this analysis is summarized in subsection 5.2.2.8.5 and Appendix I.

- Section 7 formal consultation with the US Fish and Wildlife Service (USFWS) as required by the Endangered Species Act (ESA) to determine the potential impacts of the proposed action on Federally-listed threatened or endangered species has been completed. The results of the Biological Opinion (USFWS, 1997), including reasonable and prudent measures to be implemented by FLW to minimize adverse impacts to species of concern has been described in subsection 5.5.

- The cumulative impacts analysis (subsection 5.5) has been restructured and expanded to provide additional information concerning the potential for cumulative impacts associated with the proposed action.

- The discussions in subsection 5.2.4.11 and Appendix F have been expanded to clarify the rationale for the selection of species used as receptors in the Ecological Risk Assessments.

- The discussion in subsection 5.2.2.15.B.2 has been expanded to clarify the potential health concerns associated with the use of grenades and smoke pots. Included in this discussion is information concerning the benefits of using terephthalic acid (TPA) based grenade systems as compared to hexachlorethane based systems. Additionally, subsection 3.3.3.7 has been expanded to include additional information on the use of these items.

# Section 2
# OVERVIEW OF THE PROPOSED ACTION

# Section 2: Overview of the Proposed Action

## 2.1 INTRODUCTION

This section provides an overview of actions to occur at FLW as a result of the planned relocation of the Military Police School and the Chemical School. This overview includes:

- a statement of the legislative requirement for the action (subsection 2.2);
- background information related to the action (subsection 2.3); and
- an introduction to each of the three primary elements or components of the action including:
  - ***mission activities*** to be realigned to FLW (subsection 2.4.1);
  - ***facilities*** required to support realigned activities (subsection 2.4.2); and the
  - ***population*** increases to occur at FLW as a result of the action (subsection 2.4.3).

**Section 3 provides a detailed description of the Army's proposed method of implementing these actions at FLW, and alternative implementation concepts to be evaluated in the EIS.**

## 2.2 LEGISLATIVE REQUIREMENT FOR BRAC 95 ACTIONS AT FLW

Section 1.1 of this EIS described the legislative process that was used to determine military installations to be closed, and those to receive new missions. As a result of this process, the Army is now required to relocate the Military Police School and the Chemical School to FLW. In addition, the Commission's recommendation (which is now a legal requirement) stated that the CDTF will continue to operate at Fort McClellan until such time as the capability to operate a replacement facility at FLW is achieved.

## 2.3 BACKGROUND

### 2.3.1 Decision to be Made by the Army

As stated in subsection 1.3.2.1, the Commission's decision to realign the referenced schools to FLW is exempt from NEPA analysis. Therefore, the decision to be made by the Army as a result of this EIS is focused on identification of the preferred method of implementing the mandated BRAC action at FLW.

### 2.3.2 Responsible Authority

The Secretary of Defense has delegated implementation authority to the Department of the Army. The military chain of command under the Department of the Army, which includes the Commander, U.S. Army Training and Doctrine Command (TRADOC) and the Commander, USAEC & FLW, is responsible for completing required environmental documentation and for ensuring that facilities required to support the realigned missions are available when needed. The Commander, Kansas City District, U.S. Army Corps of Engineers will provide staff and technical support as required to implement this action.

### 2.3.3 Location of Receiving Installation (FLW)

The FLW military installation is located south of Interstate 44, about 120 miles southwest of St. Louis, Missouri, and 85 miles northeast of Springfield, Missouri. Figure 2.1 illustrates the regional setting. The installation occupies approximately 62,900 acres of the Ozark Plateau region, located primarily in Pulaski County, with small portions located in Texas and Laclede counties. The land is defined by the Big Piney River on its eastern boundary and Roubidoux Creek on the western edge. Much of the surrounding land is part of the Mark Twain National Forest as shown in Figure 2.2. In addition, there are numerous private land holdings within the Mark Twain National Forest and adjacent to the FLW boundary.

The towns of Waynesville and St. Robert are the closest municipalities to FLW. Waynesville is the Pulaski county seat, and the commercial center of St. Robert straddles the Interstate 44 business spur leading south into the installation. Other towns in the area include Rolla, Jefferson City, Big Piney, Roby, Houston, Plato, Lebanon, Crocker, Dixon, Iberia, Richland, Licking and Vienna.

### 2.3.4 Overview of Missions and Military Units to be Realigned to FLW

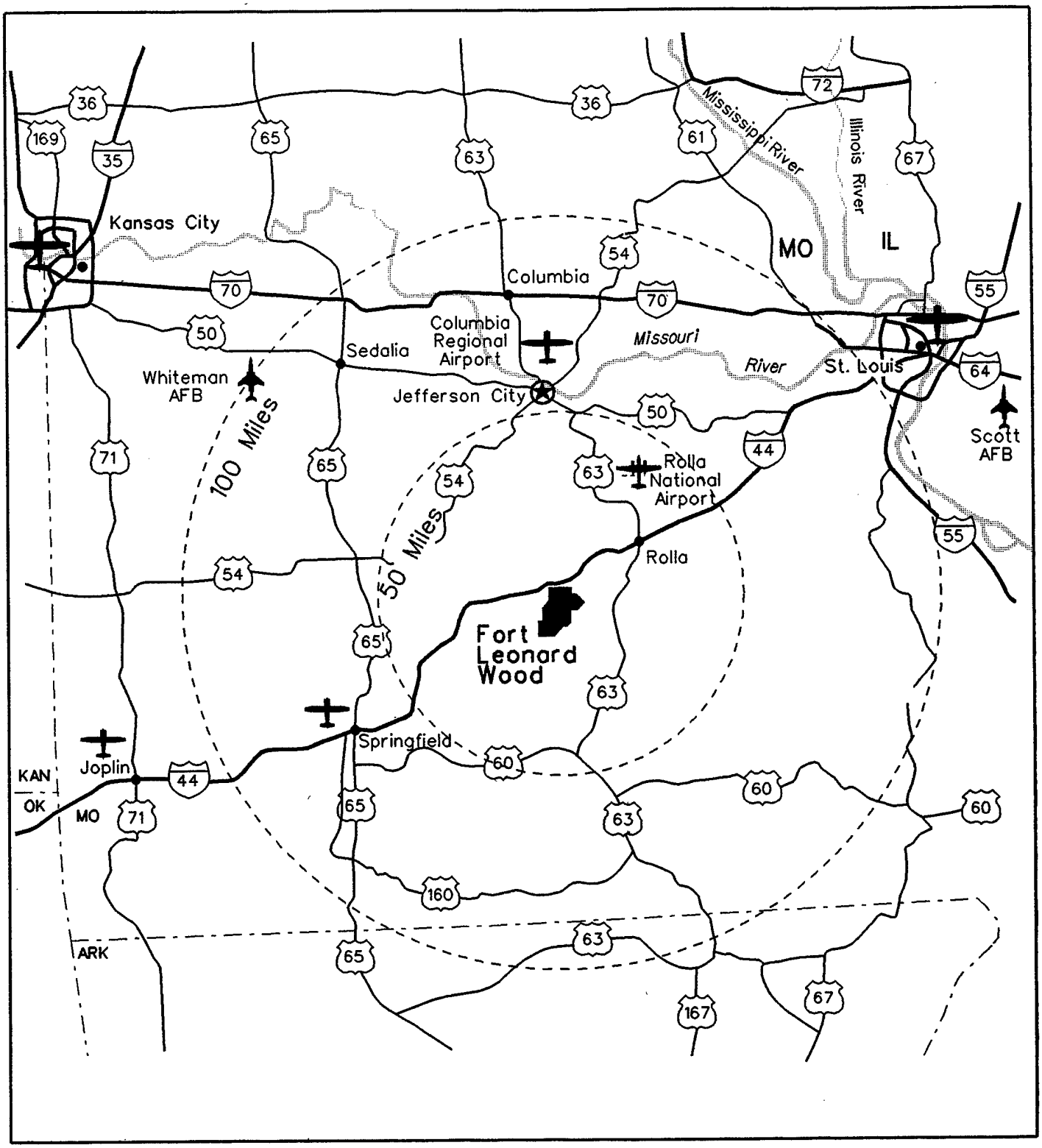
The **Military Police School** has the mission to develop technically and tactically proficient military police soldiers. Military police students are trained in traditional police functions such as traffic control and crime investigation, fraud investigation, combating terrorism, hostage negotiation, protective services, and counter narcotics investigations. Students are also trained in the areas of battlefield circulation, area security, Enemy Prisoner of War and civilian prisoner handling, and police intelligence.

The **Chemical School** has the mission to provide education and training of selected U.S. military, foreign military and civilian personnel in the detection and identification of Nuclear, Biological and Chemical (NBC) agents; protection against NBC agents; decontamination of NBC agents; employment of obscurant (smoke) systems; and expedient flame training operations.

The mandated BRAC action will also realign personnel and activities to FLW that are associated with the Chemical School including: the 11th Chemical Company (smoke and decontamination activities); and the 20th Chemical Detachment (Biological Integrated Detection System (BIDS) operations). In addition, as part of the mandated BRAC action, several existing activities at FLW will receive additional personnel to serve the expanded population. Existing activities to receive additional personnel are as follows:

- One Station Unit Training (OSUT) and Advanced Individual Training (AIT) staff;
- U.S. Army Medical Detachment (MEDDAC);
- other services' support staffs including the U.S. Air Force Detachment, U.S. Marine Corps Administrative Detachment, and U.S. Navy School Detachment;
- Non-Commissioned Officers Academy (NCOA);
- Garrison Staff; and
- other installation support staff.

All of the activities described above are considered to be "directed realignments" which are specifically identified by the Commission or required to implement Commission recommendations. The number of personnel to be relocated to FLW as a result of these BRAC actions is described in subsection 2.4.3.




Legend

State Boundary

Airfields: Military, Other

Highways: Interstate, Federally Assisted

N

Approximate Scale: 1"-37 miles

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

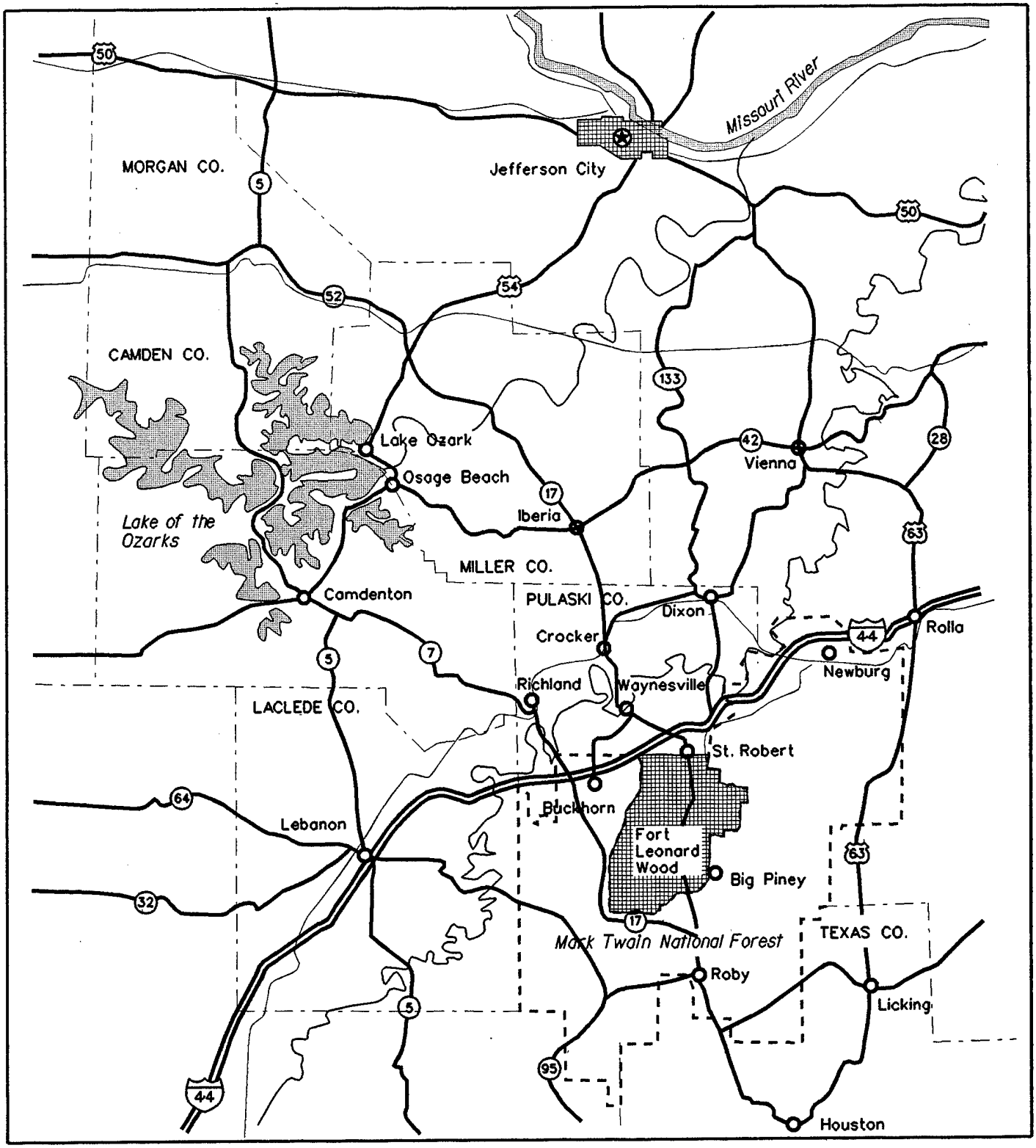
KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**REGIONAL SETTING**

DATE: **MARCH, 1997** | FIGURE NO. **2.1**




Legend

- Highways (95, 44, 63)
- Rivers/Lakes
- Railroads
- County Boundaries
- Mark Twain Forest Boundary

N

Approximate Scale: 1"=11 Miles

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**VICINITY MAP**

DATE: **MARCH, 1997** | FIGURE NO. **2.2**

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PENTABLE: BLACK.PEN

### 2.3.5 Implementation Schedule

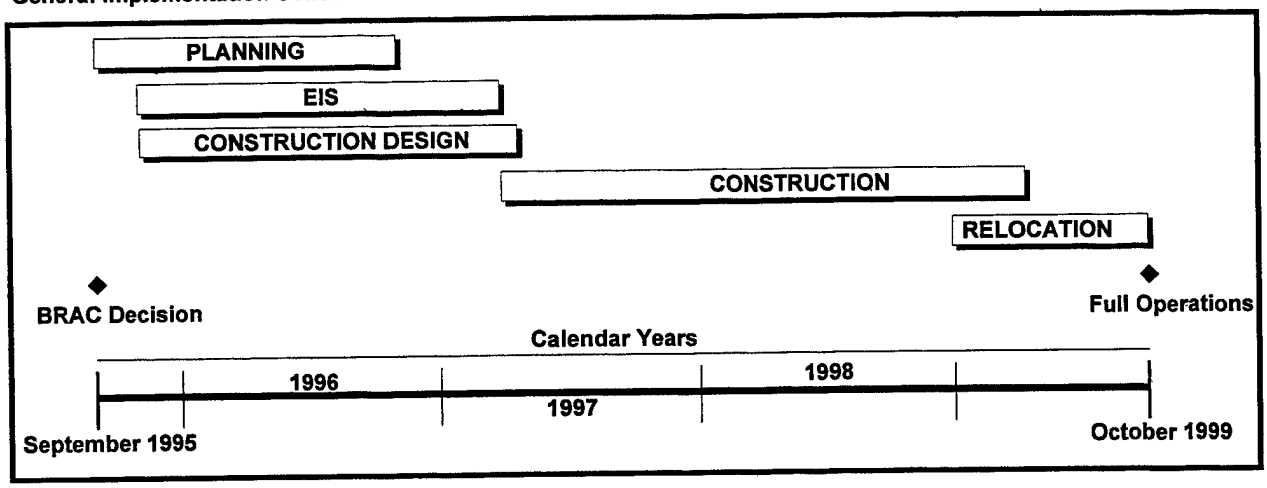
As shown in Figure 2.3, major activities relating to the BRAC actions to occur at FLW include:

- Planning of the total BRAC action;
- Preparing an Environmental Impact Statement;
- Design of new and renovated facilities;
- Constructing facilities; and
- Relocating missions and personnel to FLW.

Current schedules call for completion of these activities by October 1999. At that time, FLW will be fully operational with its new missions. As shown in Figure 2.3, the facility design process was initiated during the early planning stages of the BRAC action, and design work will proceed into the first quarter of calendar year 1997. The results of this preliminary design process are required to support identification and analysis of the Army's proposed land use and facility siting package (as defined in Section 3). However, it should be noted that the EIS process may result in changes to the Army's proposed action if they are required to avoid or minimize significant environmental impacts.

No BRAC-related construction activities will be initiated at FLW until the EIS has been completed (i.e., publication of a Record of Decision in the Federal Register). After completion of the EIS and final facility design documents, the construction phase of the BRAC action will begin. Initial construction activities are scheduled to begin in the second quarter of calendar year 1997; and all BRAC-related facilities are scheduled for completion within two years. The timing of relocating personnel to FLW is primarily dependent on the completion of the facility construction process. It is anticipated that relocation of activities may begin during the last quarter of calendar year 1998, and that the military police and chemical functions will be relocated to FLW and be fully operational by 1999.

**Figure 2.3**
**General Implementation Schedule for BRAC 95 Actions at Fort Leonard Wood**




## 2.4 OVERVIEW OF IMPLEMENTATION ELEMENTS

The primary purpose of this EIS is to help the Army decide how to implement the relocation of the Military Police School and Chemical School to FLW in compliance with the 1990 Base Closure Act. This section provides an overview of each of the implementation elements to be evaluated in this EIS. These elements are:

- **training missions** and related support activities associated with the Military Police School and Chemical School which will be relocated to FLW;

- new **supporting facilities** (new construction and facility alterations) required to provide adequate training range and support facilities to accommodate relocated missions; and

- the military and civilian **population**, (to include students) that will be relocated to FLW.

These three study elements (discussed in subsections 2.4.1 through 2.4.3 below) form the basis for the detailed development of the Army's proposed implementation method and associated alternatives, all of which are defined in Section 3.

### 2.4.1 Relocated Training Missions and Support Activities

The first major element of the BRAC action is the relocation of the Military Police School and Chemical School training missions and related training and support activities to FLW. In order to define this element, EIS study team members analyzed approximately 70 Programs of Instruction (POIs) that describe all of the training activities conducted by the Military Police School and Chemical School. The POIs provide guidance to instructors and students concerning the goals, objectives and training methods that will be used to ensure that course graduates have obtained the required level of knowledge from each course. These POIs are listed in Volume III, Appendix B of this EIS. Also listed in Volume III, Appendix B (and considered in this EIS) are nine Chemical School System Training Plans (STRAPs) which have been developed by the Chemical School to document the training requirements associated with the use of new equipment to be deployed in the future.

In addition, EIS team members reviewed the TRADOC Base Realignment and Closure 1995 Implementation Plan -- Fort McClellan, Alabama (TRADOC, 1995) and conducted interviews with Directorate of Public Works (DPW) staff from FLW to define the type and extent of base operations support (BASOPS) that will be required to accommodate the relocated missions. Interviews also focused on the identification of any new missions and related activities that can be adequately predicted and defined at this time so that they could be included in the definition and analysis of the BRAC action.

Based on this evaluation, it was determined that the BRAC-related missions could be organized for analysis in the context of eleven "training activity groups". Included within each of these training activity groups are a series of individual training goals which serve to define all BRAC-related training to be relocated to FLW. Table 2.1 lists the title of each training activity group and each related training goal, see Section 3 for a description of each training goal, related objectives and alternatives to be evaluated in the EIS.

**Section 3 identifies the objectives associated with each training goal (i.e., why it is included in the curriculum of the Military Police School and/or the Chemical School), a general description of the related training activities, a description of the Army's proposed implementation method, and alternative implementation methods where they are applicable.**

**Table 2.1:**
**Military Police School and Chemical School Training Activity Groups and Related Information**

| Training Activity Group No. | Training Activity Group Name | Related Training Goals |
|---|---|---|
| 1 | Battlefield Procedures | 1.1 Call-For-Fire Support<br>1.2 Maneuver Operations<br>1.3 Mines and Obstacles to Prevent Movement<br>1.4 Nuclear, Biological and Chemical (NBC) Warning and Reporting System<br>1.5 Night-Time Squad Engagement<br>1.6 Unarmed Self-Defense<br>1.7 Urban Terrain<br>1.8 Warfighting and Tactical Operations |

**Table 2.1:**
**Military Police School and Chemical School Training Activity Groups and Related Information**

| Training Activity Group No. | Training Activity Group Name | Related Training Goals |
|---|---|---|
| 2 | Biological Agent Detection | 2.1 Biological Integrated Detection System (BIDS) Battlefield Employment and Operation<br>2.2 BIDS Maintenance<br>2.3 Long Range Biological Standoff Detection System (LR-BSDS) Battlefield Employment and Operation<br>2.4 LR-BSDS Maintenance |
| 3 | Nuclear, Biological and Chemical (NBC) Reconnaissance Operations | 3.1 FOX Battlefield Employment and Operations<br>3.2 FOX Maintenance |
| 4 | General Military Training | 4.1 General Military Training<br>4.2 General Military Training, Field Training<br>4.3 General Military Training, NBC Personal Protective Equipment<br>4.4 Signals and Other Non-Verbal Forms of Communication<br>4.5 Radio Communications, Including Secure Communications<br>4.6 Computer Operations<br>4.7 Physical Fitness and Total Fitness |
| 5 | Military Police Operations | 5.1 Basic Military Police Functions<br>5.2 Advanced Law Enforcement and Operations Other-Than-War |
| 6 | Nuclear, Biological and Chemical (NBC) Procedures | 6.1 NBC Procedures<br>6.2 NBC Equipment<br>6.3 NBC, Decontamination, Advanced Proficiency Test (Toxic Agent)<br>6.4 NBC, Survival Recovery |
| 7 | Obscurant (Smoke) Procedures | 7.1 Obscurant, Employment Principles<br>7.2 Obscurant, Employment Operations Basic (Static)<br>7.3 Obscurant, Employment Proficiency Test (Mobile Operations)<br>7.4 Obscurant, Employment Proficiency Test (Field Training Exercises)<br>7.5 Obscurant, Generator Maintenance<br>7.6 Obscurant, Storage Operations |
| 8 | Radiation Safety | 8.1 Radiation Safety<br>8.2 Radiation, Test and Operational Equipment Storage |
| 9 | Research Support | 9.1 Research Support<br>9.2 Library, Specialized/Classified Information and Museum Artifacts |
| 10 | Small Arms Procedures | 10.1 Weapons Training<br>10.2 Weapons Training, Pistol<br>10.3 Weapons Storage |

| Table 2.1: Military Police School and Chemical School Training Activity Groups and Related Information | | |
|---|---|---|
| **Training Activity Group No.** | **Training Activity Group Name** | **Related Training Goals** |
| 11 | Vehicle Operations | 11.1 Vehicle Operations, Driver Qualification<br>11.2 Evasive Driving<br>11.3 Vehicle Maintenance Training |
| *Source: Harland Bartholomew & Associates, Inc.* | | |

### 2.4.2 Supporting Facilities (New Construction and Facility Alteration Requirements)

Subsection 2.4.1 above described the first element of the proposed BRAC actions to occur at FLW by providing an overview of training activities required to meet the mission requirements of the Military Police School and Chemical School. This subsection (2.4.2) describes the second major element of the BRAC action which is to provide required supporting facilities.

Fort Leonard Wood will need to provide facilities (buildings, specialized training facilities and designated training land areas) to meet the training needs of the Military Police School and the Chemical School, and the needs of additional personnel to be realigned to the installation. **These needs will be accommodated by a combination of:**

- **reuse or additional use of existing facilities in their present condition;**
- **alteration of existing facilities to make them suitable for new uses or activities;**
- **construction of new facilities; and**
- **rental or purchase of family housing in the local community by individual service members.**

These actions can be organized into one of two general groupings, including:

1) the modification or construction of buildings and facilities, and

2) the modification of training areas and ranges.

Modifications or construction of **buildings and facilities** will be required to provide adequate facilities to support the following requirements:

- general instruction classrooms and support facilities;
- applied (hands-on or vocational trade type training) instruction classrooms and support facilities, including the following:
  - Military Police patrol incident training;
  - Military Police response and investigation training;
  - police station operations training;
  - obscurant (smoke) generator training;
  - BIDS, LR-BSDS and FOX training;
  - decontamination equipment and procedures; and
  - the unique proficiency testing required by the chemical specialists to support their training in the detection, identification and decontamination of toxic chemical agents.

- troop housing and dining facilities for unaccompanied enlisted personnel, non-commissioned officers and commissioned officers;

- family housing for accompanied military personnel and their dependents (including the purchase, lease or rental of housing in the civilian community by individual service members); and

- maintenance and storage of approximately 910 vehicles and equipment items (as listed in Volume III, Appendix B, subsection B.2.15) which will be relocated to FLW as part of this BRAC 95 action.

Modifications or construction of **training areas and ranges** will be required to provide areas able to support specialized relocated training missions, including:

- Military Operations in Urbanized Terrain (MOUT) training; and

- more generalized live-fire weapons ranges and training areas to support the following training requirements:

    - weapons qualification and shoot/no-shoot skill development through the use of Fire Arms Training Simulators (FATS) and live-fire weapons ranges;
    - Special Reaction Team (SRT) training;
    - 9 mm, 9 mm combat pistol and shotgun training unique to the Marine Corps;
    - M60/M240 familiarization and qualification training;
    - driving and operation (including operations in an amphibious environment) of FOX vehicles, detection of simulated chemical agents with the instruments in the FOX, and use of the weapons systems provided on the FOX;
    - driving and operation of the BIDS vehicle, and detection of simulated biological agents with instruments in the BIDS ;
    - evasive driving of sedans;
    - operation of the High Mobility Multipurpose Wheeled Vehicles (HMMWVs);
    - static, mobile and field obscurant (smoke) training; and
    - the use and construction of measures designed to prevent the movement of personnel on a battlefield.

Requirements associated with these two general groupings (i.e., modification or construction of buildings and facilities, and modification or construction of training areas and ranges) have been defined in the context of eight construction packages. These construction packages include:

1) General Officers Quarters (Project 38174);
2) Sixteen Building Military Operations in Urbanized Terrain (MOUT) Facility (Project 45892);
3) Chemical Defense Training Facility (Project 45893);
4) General Instruction Facility (Project 46090);
5) Applied Instruction Facility (Project 46091);
6) Unaccompanied Personnel Housing (Barracks) (Project 46092);
7) Range Modifications (Project 46094); and
8) Convert Housing (Project 46640).

**A description of the Army's proposed BRAC land use plan and related facility sites for these construction projects (including general location maps) is presented in Section 3 along with alternative land use/facility siting concepts to be analyzed in this EIS. General descriptions of all BRAC facility requirements are presented in subsections 2.4.2.1 through 2.4.2.8 below.** These descriptions include the total amount of area required to support the BRAC actions. As discussed earlier in this section and in Volume III, Appendix C, *Identification and Screening of Support Facilities Alternatives*, subsection C.3 the Army's Proposed Action will include a combination of:

- reuse of identified existing, available facilities at FLW, including areas that would be made available through changes in existing management practices and facility assignments, in their present condition;

- alteration of existing facilities to make them suitable for new uses or activities;

- construction of new facilities; and

- rental or purchase of family housing in the local community by individual service members.

Additional information and details regarding these construction, renovation and modification packages is provided in Appendix C. All construction projects will include construction best management practices and long-term construction features to ensure compliance with Federal, state and local regulations, including Missouri Clean Water requirements, at FLW. These practices include:

- the implementation of erosion control measures during construction such as the construction of erosion and sediment control measures as the first step in construction, the maintenance of erosion and sediment control measures throughout the construction process, staging of construction activities to minimize the exposure time of cleared surfaces, and the staging of activities to allow for stabilization of disturbed soils;

- reestablishment of temporary and permanent vegetative cover at construction sites through plantings, seed or sod with both native and ornamental plants (although an emphasis will be placed on the use of native plantings), the stripping and stockpiling of top soil, spreading top soil after construction, mulching all seeded areas, and the use of existing natural features for landscaping at construction sites; and

- provision of surface water and stormwater runoff controls, including drainage swales, both temporary and permanent surface water sediment retention and control catchment basins and ponds, curbs, gutters, and drop inlets.

Altered areas within existing facilities, additions to existing facilities, and newly constructed facilities will meet current Army Energy Conservation requirements which will reduce the amount of energy required for heating, cooling and lighting the areas, thereby resulting in reduced air emissions than would be anticipated from similarly sized existing facilities.

**2.4.2.1 General Officers Quarters (Project 38174).** As discussed in Volume III, Appendix C the existing family housing assets, with the exception of General Officer Quarters, are adequate to support the anticipated requirements for additional family housing (when augmented by off-post housing assets). This project will provide two additional general officer family housing units.

**2.4.2.2 Sixteen Building Military Operations in Urbanized Terrain (MOUT) Facility (Project 45892).** As discussed in Volume III, Appendix C, all live-fire weapons ranges and training area improvements have been consolidated into one of two projects (as described in this paragraph and subsection 2.4.2.8). This project will provide a sixteen-building MOUT training facility. The facility is to be used to train soldiers in tactics and techniques for MOUT operations under simulated combat conditions. The 3,600-square-foot range support facility constructed at this MOUT, and all other facilities are intended for use by able-bodied military personnel. The MOUT complex will be a non-live fire company collective training facility. The MOUT will include 16 buildings (9 intact and 7 partially reduced to rubble) with streets, parking, a simulated (non-functional) underground sewer network, information systems and other features required to simulate an urban setting.

**2.4.2.3 Chemical Defense Training Facility (CDTF) (Project 45893).** The unique applied instruction training requirement of the Chemical School includes a requirement to provide proficiency testing for personnel in the detection, identification and decontamination of toxic chemical agents; and the decontamination of personnel, personal equipment and unit equipment. Additional information on this requirement is contained in Volume IV, *Identification and Screening of Alternatives to Accomplish Training*

*Goals.* Because of the unique nature of this facility, the construction requirements associated with this training have been defined in a separate construction project. This facility, with approximately 68,500 square feet, will include:

- eight negative air pressure training bays;
- a technical support section to clean, service and certify protective equipment;
- a laboratory for the proper storage and mixing of small quantities of toxic agents used for training events;
- mechanical air filtration equipment with activated charcoal filters and monitoring equipment to measure for the presence of agent;
- specialized facilities that will allow for the decontamination and monitoring of training materials to ensure they have been properly decontaminated and are properly handled;
- three 10,000 gallon storage tanks (with secondary containment facilities) to hold and monitor decontaminated waste water that is a byproduct of toxic agent training prior to disposal; and
- related administrative and general instruction classrooms.

Additional information on this project is provided in Volume III, Appendix C, Identification and Screening of Support Facilities Alternatives, and Appendix I, Alternative Methods for CDTF Waste Disposal.

**2.4.2.4 General Instruction Facility (Project 46090).** This project (or construction package) will provide a total of approximately 395,000 square feet of general and applied instruction facilities and administrative areas that will be required to support Officer and advanced Non-Commissioned Officer (enlisted) training associated with the Military Police School and Chemical School. As discussed in Volume III, Appendix C, these requirements have been consolidated into one construction package, which includes use of existing available facilities, renovation of existing facilities and the construction of new facilities. A total of approximately 300,000 square feet of new facilities will be constructed as part of this project. The project package has been entitled "General Instruction Facility", as the general instruction classrooms are the predominate use. This project will include the following functions and approximate areas:

- 140,000 square feet of general instruction classrooms similar to the classrooms found in a typical college environment;
- 128,000 square feet of general purpose administrative offices;
- 81,000 square feet of computer and student-centered multimedia laboratories;
- 23,500 square feet of applied instruction classrooms including FOX simulator bays, FOX VOS-25 trainer and FOX MM1 trainer areas, BIDS simulators, BIDS Component Laboratories, LR-BSDS Simulator, armored security vehicle mock-up training area, communications and vulnerability assessment laboratories, a Contingency Support Mobile Training Facility, a Dragon Warfighter simulator center, a Maneuver Control System Lab, and mock crime scene rooms to assist in Military Police Training;
- 20,000 square feet for a radiation laboratory (RADLAB) that will require Nuclear Regulatory Commission (NRC) approval and licensing;
- 18,000 square feet of library shelf space to provide storage for approximately 45,000 volumes from the Military Police School and Chemical School library collections;
- 2,200 square feet of secure storage for restricted and classified documents; and

- an exterior training area including an exterior plaster cast pit and static equipment display area.

**2.4.2.5 Applied Instruction Facility (Project 46091).** Numerous facility requirements have been consolidated into this military construction package as discussed in Volume III, Appendix C. Together the identified requirements associated with this project total approximately 345,000 square feet. This project will include the use of existing areas, renovation and improvement of existing areas, and the construction of new areas. A total of approximately 198,000 square feet of new facilities will be constructed as part of this project. This project has been entitled "Applied Instruction Facility" since the applied instruction classrooms are the predominate use. The project consists of providing the following support facilities:

- Approximately 177,000 square feet for Military Police OSUT and Advanced Law Enforcement Training which includes general instruction classrooms, mock crime scenes, a mock confinement facility, a mock police station, communications lab, classrooms and barracks for the Rehabilitation Instructor Training Course (RITC), exterior training areas, supply/storage, and instructor preparation and general administration areas. These facilities will be constructed in a manner to allow them to be used as a Patrol Incident Training Area which will allow both interior and exterior training to occur in an isolated and controlled environment.

- Approximately 42,000 square feet for a Chemical Decontamination Apparatus Training Facility (DATF) which includes general and applied instruction classrooms, instructor preparation and general administration areas, and exterior training areas used to instruct personnel on the proper use and maintenance of equipment.

- Approximately 43,000 square feet of area to house the artifacts of the Military Police Museum and Chemical Museum.

- Approximately 3,000 square feet for instruction on maintenance of the BIDS and FOX vehicles.

- Approximately 80,000 square feet of warehouse storage area for the training aids and materials used to support training at the Military Police School and Chemical School.

- Vehicle maintenance and parking areas for approximately 910 vehicles and pieces of equipment which will be relocated to FLW as part of the BRAC action.

**2.4.2.6 Unaccompanied Enlisted Personnel Housing (Project 46092).** This is the first of two projects that will specifically address the support requirements associated with troop housing and dining facilities for Unaccompanied Enlisted Personnel Housing (UEPH). The second project, discussed in subsection 2.4.2.5, will convert existing available family housing to new uses and renovate Unaccompanied Officer Personnel Housing (UOPH). A total of 1,662 additional UEPH barracks spaces will be required. Depending upon the land use plan selected for implementation, the number of additional barracks spaces that will be provided through the conversion of existing facilities and the number that need to be constructed will change. Details regarding the Army's proposed action and alternatives are provided in Section 3.

This project will provide a total of 888 UEPH barracks spaces, based on the U.S. Army standard "1+1" living/sleeping (private and semi-private) room module. These new spaces will be provided in three separate barracks buildings and will consist of a total of approximately 270,000 square feet. Each barracks building will include a Soldier Community Building with approximately 14,618 square feet, resulting in an additional 43,854 square feet of new construction. These Soldier Community Buildings will include common use areas such as day/TV rooms, exercise rooms, laundry facilities, and storage rooms. This project will also construct a new dining facility and recreational and company operations facilities for the new barracks area.

The construction of a new dining facility at Specker Barracks (the 1700-area UEPH barracks) or the renovation of an existing dining facility at Specker Barracks (depending upon the land use plan selected) will also be included in this project.

**2.4.2.7 Range Modifications (Project 46094).** This project package includes the modification of existing training areas and live-fire weapons ranges to support the unique training requirements of the Military Police School and Chemical School. The project will provide the following:

- multiple Fire Arms Training Simulators (FATS) areas;
- Special Reaction Team (SRT) training areas and specifically designed live-fire weapons ranges;
- 9 mm, 9 mm combat pistol, and shotgun live-fire ranges designed to meet the unique requirements of the Marine Corps;
- M60/M240 machine gun, FOX machine gun, Mark 19 grenade machine gun, and M249 squad assault weapon training areas;
- Biological Integrated Detection System (BIDS), FOX, High Mobility Multipurpose Wheeled Vehicle (HMMWV) and evasive driving training areas where personnel are provided an opportunity to develop and demonstrate required skills;
- Obscurant (smoke) training areas where students are instructed on the starting, stopping, and operation of fog oil smoke generators (static training); the operation of the generators in a mobile environment (mobile training) and as part of a larger field training exercise (field training), and the use of other forms of obscurants (smoke grenades and smoke pots); and
- development of an flame field expedient (FFE) deterrents demonstration and training area for instruction on FFE deterrents and other items designed to prevent the movement of enemy personnel on a battlefield.

As discussed in Volume III, Appendix C, this project will also include:

- construction of an additional NBC Training Area including a CS (tear) gas chamber;
- construction of a small vehicle maintenance area near the HMMWV training and vehicle parking areas; and
- construction of additional range support instruction and administrative areas.

**2.4.2.8 Convert Housing (Project 46640).** This project is the second of two projects that will provide housing for unaccompanied officer and enlisted personnel. This project (as discussed in detail in Volume III, Appendix C) will renovate and convert up to 194 excess family housing quarters near Indiana Avenue and renovate approximately 168 Junior officer quarters at Sturgis Heights to meet part of the additional housing requirement at FLW.

### 2.4.3 Realigned Population

The third (and final) major element of the proposed BRAC action is to realign the Army and civilian population associated with the Military Police School and Chemical School and associated units to FLW. It should be noted that the population numbers provided below are based on the best available information at the time that baseline data was collected to support this EIS (mid-1996). However, actual unit strength may be affected by other current force modernization and restructuring initiatives, and minor changes in unit or support staff strength that may occur prior to implementation of the BRAC realignment. If changes occur in the actual number of personnel to be relocated, these changes will be reviewed to determine if they warrant additional environmental analysis.

Table 2.2 provides a summary of FLW population data including:

- the total population during 1990 (prior to drawdowns that occurred between 1990 and 1995 and the timeframe in which the most current FLW Master Plan was developed);

- the population at the time of the BRAC decision (1995 - EIS baseline) before the implementation of Interservice Training Resources Organization (ITRO) realignments involving engineer skills and driver training for all military services;

- projected pre-BRAC population after completion of currently scheduled and approved ITRO realignment actions (1999) but prior to the arrival of Military Police School and Chemical School related personnel;

- the projected BRAC 95 population to be realigned to FLW; and

- the total projected post-BRAC population (1999) which adds those positions and students associated with the total planned BRAC actions.

**Table 2.2:**
**Population Summary for Fort Leonard Wood (1990 through 1999)**

| Population Group | FLW Total Population [1] (1990) | EIS Analysis Baseline Population [2] (1995) | Without Projected BRAC Population [3] (1999) | Projected BRAC Population Increase [4] | With Projected BRAC Total FLW Population (1999) |
|---|---|---|---|---|---|
| Permanent Party Military [5] | 7,263 | 4,174 | 4,632 | 1,599 | 6,231 |
| Trainees/Students | 10,513 | 4,803 | 8,306 | 3,295 | 11,601 |
| **Subtotal Military Personnel** | **17,776** | **8,977** | **12,938** | **4,894** | **17,832** |
| DA Civilians Permanent Party | 2,199 | 1,903 | 1,642 | 341 | 1,983 |
| Other Civilian [6] | 2,729 | 2,368 | 2,752 | 157 | 2,909 |
| Civilian Students | 0 | 0 | 0 | 83 | 83 |
| **Subtotal Civilian Personnel** | **4,928** | **4,271** | **4,394** | **581** | **4,975** |
| Dependents On-Post | 6,801 | 5,425 | 5,276 | 774 | 6,050 |
| Dependents Off-Post | 2,738 | 2,124 | 3,108 | 2,847 | 5,955 |
| **Subtotal Dependents** | **9,539** | **7,549** | **8,384** | **3,621 [7]** | **12,005** |
| **Total Personnel** | **32,243** | **20,797** | **25,716** | **9,096** | **34,812** |
| Effective Population [8] | 23,953 | 14,017 | 17,920 | 5,577 | 23,497 |

Source notes:
1 Fort Leonard Wood, Directorate of Resource Management, Post Population Profile, dated 30 Sept 1990.
2 Fort Leonard Wood, Directorate of Resource Management, Actual Population for FY 95.
3 Fort Leonard Wood, Directorate of Resource Management, Projected FY 96 Population Data.
4 Army Stationing and Installations Plan (ASIP) Station Report - BRAC.
5 Does not contain Permanent Change of Station students; students in "Trainees/Average Daily Student Load."
6 Fort Leonard Wood, Directorate of Resource Management, FY 96 Projected Figures.
7 Includes 3,360 military dependents and 261 dependents (all off-post). Civilian dependents based on 35% of civilian authorizations increased from outside of FLW area times Fort McClellan dependent population (2.10) (cross check of 35% increase from outside area), times 341 personnel, times 75% married personnel, times 2.29 dependents per married person, equals 261 dependents for civilians.
8 Effective population calculation used for utility infrastructure analysis only, as discussed in subsections 4.7.1 and 5.2.2.7.1.

*Source: Fort Leonard Wood, Directorate of Resource Management*

Permanent party personnel are those military members and DA civilians that are assigned to the installation. In the case of the BRAC realignment, most of these positions are required to conduct training at the Military Police School and the Chemical School, and to provide administrative support for the schools. With the relocation of personnel, FLW will experience a permanent party military increase of approximately 1,599 persons, and a 341-person increase in permanent party civilian population. The dependent family member population will increase by approximately 3,621 dependents.

In addition to the permanent party personnel relocations, the BRAC realignment will result in an increase of approximately 2,130 trainees and 1,165 students (for a total of 3295) and approximately 83 civilian students. These figures are based on calculation of an average daily load over the period of each training

year. The total increase in FLW population at the completion of BRAC actions and the relocation of personnel will be approximately 67 percent higher than the population that was at FLW at the time BRAC actions were announced in 1995. However, as shown in Table 2.2, the total projected post-BRAC population (scheduled for full implementation in 1999) will represent only a 35 percent increase in population versus the anticipated population that would have existed at FLW without the BRAC action, and an 8 percent increase in population versus the population that existed at FLW in 1990, before the downsizing of U.S. Armed Forces began.

The majority of the population increase is associated with the relocation of the Military Police School and the Chemical School. However, several existing activities at FLW will receive additional personnel to serve the expanded population. These activities include: OSUT and AIT staff, MEDDAC staff, the NCOA staff, general Garrison (administrative) staff, and other services' support staffs. Population increases as a result of these expanded activities are included in the figures described above.

Additional information concerning the FLW regional and local population trends and demographics is located in subsection 4.12 of Section 4, *Affected Environment.* **A description of the Army's proposed method of implementing the realignment of the Military Police School and Chemical School population to FLW is provided in Section 3.**

# Section 3
# DESCRIPTION OF ALTERNATIVES CONSIDERED - INCLUDING THE PROPOSED ACTION

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# Section 3: Description of Alternatives- Including the Proposed Action

## 3.1 INTRODUCTION

The Defense Base Closure and Realignment Act of 1990 mandates the relocation of the Military Police School and Chemical School to FLW. As stated in Section 2, the planned BRAC action is described in the context of three primary implementation elements including:

- relocate the **training missions** and related support activities associated with the Military Police School and Chemical School;
- provide **support facilities** as required to provide adequate training and support facilities to accommodate the relocated missions, population and associated vehicles; and
- relocate the **population** (military and civilian) associated with the Military Police School and Chemical School to FLW.

As shown on the Table of Contents on the opposite page, Section 3 has been structured to provide a description of alternatives to be evaluated in the Environmental Impact Statement (EIS). This discussion includes a more detailed presentation of the Army's Proposed Action for each implementation element (versus the overview of the action presented in Section 2) to facilitate a direct comparison of the Army's proposed action to other implementation alternatives to be evaluated. The following subsection (3.2) summarizes the extensive process that was used to formulate alternatives for detailed analysis in the EIS, and refers the reader to supporting documentation that provides additional details and background information. Subsection 3.7 identifies the Army's Preferred Action for relocating the Military Police School and Chemical School to FLW.

## 3.2 SUMMARY OF ALTERNATIVES FORMULATION PROCESS

Figure 3.1 provides a graphic summary of the process used to formulate alternatives for each of the three primary elements of the action to be evaluated in this EIS. This process was coordinated with key state and Federal review agencies through a series of agency coordination workshops (see subsection 1.4.3). The alternatives formulation process was also presented at the public scoping meeting conducted in the FLW area during the early stages of the EIS. A narrative summary of this process is provided in subsections 3.2.1 through 3.2.3 below.

## Figure 3.1 - Detailed Flow Chart of Alternative Formulation and Evaluation Process
## Fort Leonard Wood BRAC 95 EIS (Page 1 of 2)

**Alternative Formulation & Screening**

# I. Relocate Training Mission

(See Volume IV of EIS for Detailed Discussion of Training Alternatives Formulation)

- **TRAINING ACTIVITY GROUP 1 - BATTLEFIELD PROCEDURES:**
  - **Training Goal 1.1 - Call-For-Fire Support**

| Alternative Realign Mission Concepts: | Prel. Alternatives Screening (Initial Screen) | (Second. Screen) | (Third Screen) |
|---|---|---|---|
| 1. No Action Alternative * | Not Viable | N/A | N/A |
| 2. Relocate Current Practice ** | Viable | N/A | On-Post |
| 3. Potential Modified Methods: | | | |
| Option 1 - Lecture Only | Not Viable | N/A | N/A |
| Option 2 - Field/Man. Training | Not Viable | N/A | N/A |
| Option 3 - Computer Simulate | Viable | Not Pref. | N/A |

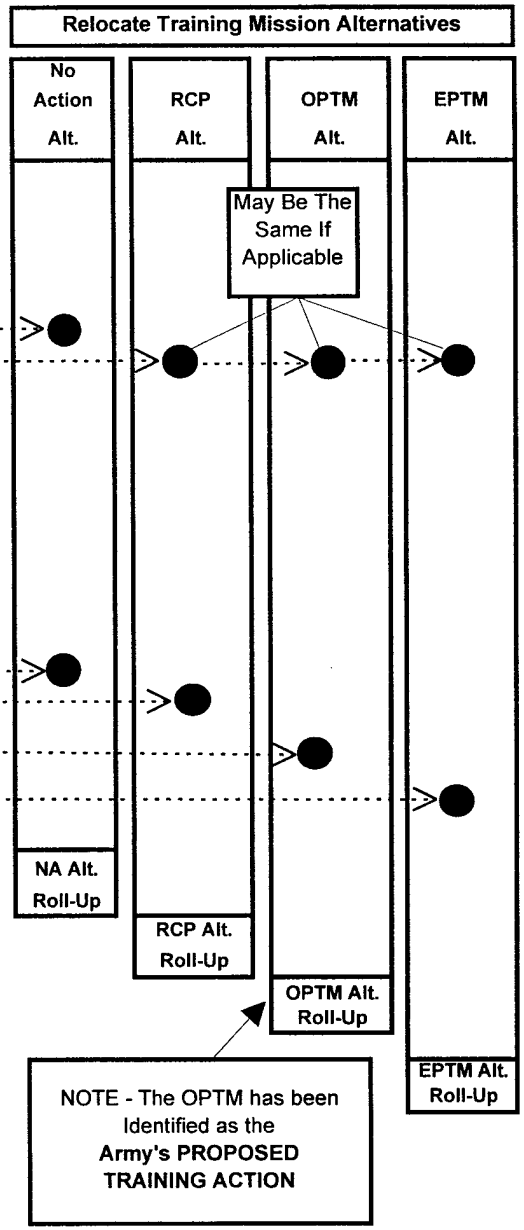
- **TRAINING ACTIVITY GROUP 7 - OBSCURANT PROCEDURES:**
  - **Training Goal 7.2 - Obscurant Operations (Static)**

| Alternative Realign Mission Concepts: | Prel. Alternatives Screening (Initial Screen.) | (Second. Screen.) | (Third Screen.) |
|---|---|---|---|
| 1. No Action Alternative * | Not Viable | N/A | N/A |
| 2. Relocate Current Practice ** | Viable | N/A | On-Post |
| 3. Potential Modified Methods: | | | |
| Option 5 - Reduce Time/Modify | Viable | OPTM | On-Post |
| Option 6 - Reduce Time/Simul. | Viable | Not Pref. | N/A |
| Option 7 - Water/Recycle | Viable | EPTM | On-Post |
| Options 1,2,3,4,8 & 9 | Not Viable | N/A | N/A |

Screening Process was Applied to ALL Training Goals within each of Eleven Training Activity Groups (Documented in Volume IV of EIS).

* Implementation of the No Action Alternative was Determined to be Non-viable through initial screening process. However, the NA Alternative is used as the baseline for describing impacts of Alternative Implementation Plans.
** To be Evaluated for each Training Goal.
*** Considered on-post vs. off-post location.
N/A = Not Applicable
Not Pref. = Not Preferred or Selected as OPTM or EPTM during Secondary Screening. In all cases, omitted viable alternatives expected to have equal or more adverse environmental impact than EPTM Alternative.
RCP Alt. = Relocate Current Practice Alternative
OPTM Alt. = Optimum Preferred Training Method Alternative
EPTM Alt. = Environmentally Preferred Training Method Alternative

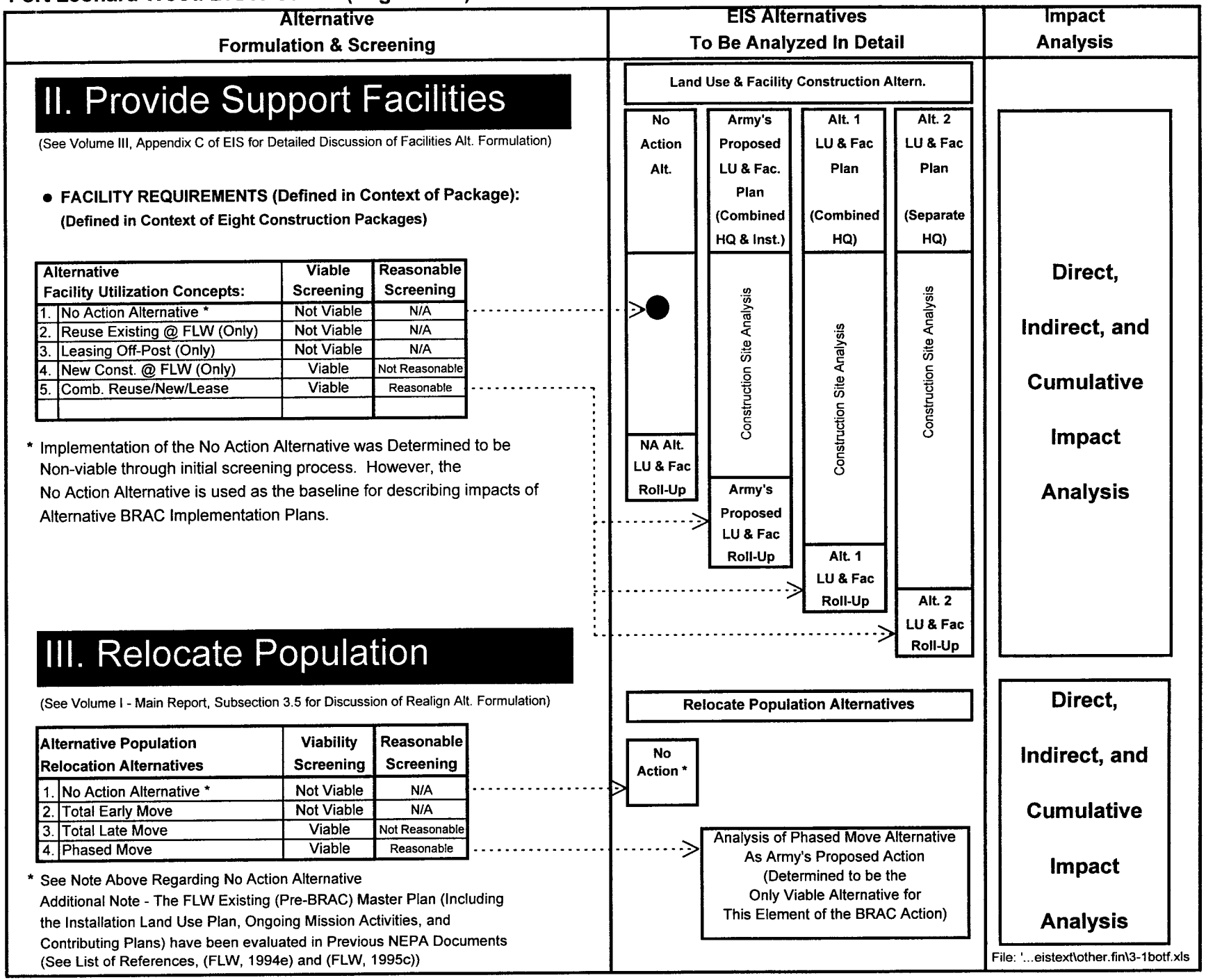
**EIS Alternatives To Be Analyzed In Detail**




**Impact Analysis**

**Direct, Indirect, and Cumulative Impact Analysis**

**Figure 3.1 - Detailed Flow Chart of Alternative Formulation and Evaluation Process**
**Fort Leonard Wood BRAC 95 EIS (Page 2 of 2)**



### 3.2.1 Element 1: Formulation of Training Alternatives.

The first element involved a detailed analysis of the Military Police School and Chemical School training missions to be relocated to FLW. As discussed in subsection 2.4.1, an analysis of the training missions to be relocated indicated that the planned activities could be assigned to one of 11 "Training Activity Group" (TAG) categories that were established to support the EIS process. The team then proceeded to identify a total of 43 specific "Training Goals" (TG) to be accomplished under the broad TAG headings. These training activity groups and related training goals are listed in Section 2, Table 2.1. The training alternatives formulation process then proceeded with the following work elements:

- Documentation of the training methods that were in use by the Military Police School and the Chemical School at FMC at the time the BRAC 95 announcement was made.

- Formulation of a wide range of alternative training methods that could possibly be used to accomplish each training goal. A total of 206 alternative training methods were considered as part of this process, including the 43 current practice methods.

- Application of a five-step screening process designed to identify an appropriate range of reasonable alternatives for analysis in the EIS as summarized below:

  - **Step 1** determined if each method was "viable" in terms of its ability to meet minimum acceptable requirements for accomplishing the associated training goal and that it could be accomplished in a reasonably safe manner. Training methods which will not result in the required minimum level of skill development and training methods that resulted in unnecessary safety risks for the students, staff or members of the surrounding civilian community were determined to be non-viable. Additional information concerning this initial screening process is provided in Volume IV, subsection IV.5.

  - **Step 2** included the development of a more detailed descriptions of the viable training method alternatives. These more detailed descriptions of the viable training methods are located in Volume IV, subsection IV.6

  - **Step 3** applied a range of initial evaluation criteria to those methods that passed the Step 1 screening to allow the study team to identify: 1) the Optimum Training Method (OPTM) for accomplishing each training goal based on consideration of a combination of operational and environmental screening criteria; and 2) the Environmentally Preferred Training Method (EPTM) based solely on consideration of the same preliminary environmental screening criteria that were used to help define the OPTM. The screening was based on the relative, anticipated ability of the training methods to provide the required level of skill proficiency; the relative potential environmental impacts that would be associated with the training methods; as well as the short- and long-term costs associated with implementing the alternative. The screening criteria used for this step of the process are listed below. The application of these criteria are further defined in subsection IV.7 of Volume IV.

    **Environmental Screening Criteria Headings:**
    - Air Quality
    - Noise
    - Fish and Wildlife Species and Habitat
    - Federal-Listed Threatened and Endangered Species
    - Water Quality
    - Wetlands

    **Training & Operating Efficiency Criteria Headings:**
    - Construction, Operations and Maintenance Costs

- Development Costs
- Safety
- Support Requirements
- Training Flexibility
- Training Realism and Effectiveness

- **Step 4** consisted of a third screening in the training alternative screening process by considering the ability to accomplish each training goal using lands within FLW boundaries, and the ability to reduce environmental impacts by conducting training outside the boundaries. A discussion of the potential to use lands outside of current FLW boundaries, and the reasons why this was not considered to be a reasonable alternative is presented in Volume IV, subsection IV.7.4.

- **Step 5**, resulted in the grouping of alternatives for analysis in the EIS, as discussed in Volume IV, subsection IV.8. The groupings included the Relocate Current Practice (RCP) Alternative, Optimum Training Method (OPTM) (Army's Proposed Action), and the Environmentally Preferred Training Method (EPTM).

**Application of this process led to the formulation of three "Relocate Training Mission" implementation alternatives for consideration in the EIS. These alternatives are referred to as the:**

- **Relocate Current Practice Alternative** (RCP Alternative);

- **Optimum Training Method Alternative** (OPTM Alternative) **(which has been identified as the Army's Proposed Action for the training mission implementation element)**; and the

- **Environmentally Preferred Training Method Alternative** (EPTM Alternative).

Subsection 3.3.2 provides a comparative description of the intent of each of these training alternatives.

**3.2.1.1 Similarity of Training Method Alternatives for Certain Training Goals.** It should be noted that in many cases, the alternatives formulation process led to the conclusion that the RCP Alternative for certain training goals was also the OPTM (Army's Proposed Action) Alternative as well as the EPTM Alternative. This is illustrated in Figure 3.1 for Training Goal 1.1, "Call-for-Fire Support", which is essentially a classroom training activity. For training goals where it was determined that the RCP, OPTM (Army's Proposed Action) and EPTM alternatives are the same, this conclusion was based on the screening process documented in Volume IV. For these cases, the Volume IV analysis generally indicates that there are no other acceptable methods to meet the training goal, or that the available alternatives were not expected to result in any discernable difference with regard to potential impacts on the environment.

For example, for training goals that only involve classroom instruction (such as Training Goal 1.1, "Call-for-Fire Support) it was often determined that there were no reasonable alternative methods to accomplish this aspect of the overall training mission. However, for those training activities where the formulation process identified viable alternative implementation methods that had the potential to provide greater operational and/or environmental benefits, the difference in alternatives was clearly defined in the context of the RCP, OPTM (Army's Proposed Action) and EPTM alternatives. These differences serve as the basis for comparative National Environmental Policy Act (NEPA) analysis for this element of the action. (See Figure 3.1 under Training Goal 7.2, "Obscurant Operations - Static" for an example of a training goal that warranted identification of three distinct alternatives based on this analysis procedure.) This approach provides the Army decision-maker and the public with information required to make an informed decision in selection of an Army Preferred Action for implementing Military Police School and Chemical School training activities at the completion of the EIS process.

**3.2.1.2 Training Alternatives Excluded from Detailed Analysis.** It should also be noted that not all of the alternatives identified in Volume IV of the EIS have been carried forward for more detailed evaluation in Section 5 of the EIS. However, the alternative formulation methodology that was used was designed to select an appropriate range of alternatives for analysis in the context of associated environmental impacts, costs, and operating procedures. Furthermore, it should be understood that for each training goal, the viable alternative that was identified as having the most potential to reduce environmental impacts was identified and included for analysis as the EPTM Alternative. The training alternatives formulation and screening process is fully documented in Volume IV of this EIS, *Identification and Screening of Alternatives to Accomplish Training Goals at Fort Leonard Wood.*

### 3.2.2 Element 2: Formulation of Supporting Facility Alternatives

The second element of the alternatives formulation process involved consideration of the type, extent and location of support facilities that will be required to meet the needs of the training missions and personnel to be relocated to FLW. As illustrated on Figure 3.1, (top half of page 2 of 2) this process began with an analysis of the viability of reusing existing facilities at the installation to meet the needs of the planned action; the potential to lease off-post facilities; the feasibility of meeting all requirements through new construction at the installation; and the feasibility of using a combination of facility reuse, new construction and off-post leasing. Based on this analysis, it was determined that the combination approach was the only viable concept. The EIS study team then proceeded with the identification of three alternative "Land Use and Facility Plans" for detailed analysis in the EIS. These three plans were titled based on the functional relationships that would be created between the three schools (the Military Police School, the Chemical School and the Engineer School). **The three land use and facility plans are referenced as:**

- **Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction)**, which would provide the highest practical degree of collocation and consolidation of facilities. This alternative is referenced in Section 5 as the Army's Proposed Land Use and Facility Plan (LU & FP) Combined Headquarters and Instruction (CH&I).

- **Alternative 1 Land Use and Facility Plan (Combined Headquarters)**, which would collocate the headquarter functions for each school, but provide three separate "school houses" thereby allowing the individual speciality branches to retain more autonomy. This alternative is referenced in Section 5 as Alternative 1 LU & FP Combined Headquarters (CH).

- **Alternative 2 Land Use and Facility Plan (Separate Headquarters)**, which would provide individual school headquarters and training areas, providing the maximum amount of individual branch autonomy. This alternative is referenced in Section 5 as Alternative 2 LU & FP Separate Headquarters (SH).

Each of the alternative BRAC implementation land use plans were developed to ensure that future land uses at FLW are consistent with prior use and the intent of the existing *Master Plan for the U.S. Army Engineer Center and Fort Leonard Wood* (FLW, 1991c). It should be noted that the existing FLW land use plan (pre-BRAC) has been evaluated in a recent NEPA document entitled the *Final Environmental Assessment of the Master Plan and Ongoing Mission* (FLW, 1995c). Therefore, on-post land use analysis in this EIS will be limited to consideration of relatively minor changes that would occur to the existing land use patterns under each of the BRAC land use and facility plan alternatives. Details regarding the alternative land use and facility plans are presented in subsection 3.4. Additional background information regarding each step used to formulate the land use and facility plans are provided in Volume III, Appendix C.

### 3.2.3 Element 3: Formulation of Population Relocation Alternatives

The third and final element of the alternatives formulation process involved consideration of the population to be relocated to FLW as a result of the proposed actions. The relocation of the Military Police School

and Chemical School to FLW is mandated by BRAC Commission recommendations which were accepted by the President and Congress. Therefore, it was determined that alternatives for this element are most logically associated with the timing of personnel movements. Therefore, the EIS considers the relationship of the planned training activities to occur, the facilities that will need to be provided to accommodate these training needs, and the timelines required to bring these facilities on-line.

Subsection 3.5 discusses the conclusions associated with consideration of a "Total Early", a "Total Late", and a "Phased" movement of the military and civilian population. Based on this analysis, it was determined that the phased movement of military and civilian personnel was the only viable alternative. **Therefore, the Phased Move Alternative for this element will represent the Army's Proposed Action under all evaluation scenarios.**

## 3.3 TRAINING ALTERNATIVES

### 3.3.1 No Action Alternative

The BRAC process (and associated legislative restrictions as discussed in subsection 1.3.2.1) has unique implications regarding consideration of the No Action. The decision to relocate the Military Police School and Chemical School to FLW is mandated by BRAC law, and this decision is specifically excluded from NEPA analysis. However, the Army is required to evaluate alternative methods for implementing these training missions at FLW.

As part of this thought process, the EIS study team considered each of the 43 training goals associated with the Military Police School and Chemical School to determine if training associated with each goal was required to meet overall mission requirements. As discussed in Table IV.1 of Volume IV of the EIS, it was determined that failure to provide training associated with any of the 43 training goals was not reasonable since training in each of the currently identified training goals is considered to be essential to meeting mission requirements of the schools. Failure to train military personnel in these training goals would result in a loss of required military skill and deployment readiness for the individual soldier and the unit. This loss in military skill would adversely impact operations, troop safety and national defense capabilities. Therefore, the EIS will not give any further consideration to eliminating specific training goals and their related activities.

Regardless of the status of the relocation of the Military Police School and Chemical School, FLW will continue all current, ongoing and planned (pre-BRAC decision) operations and training activities. Therefore, the environmental baseline for this EIS is based on identification of conditions at FLW as they existed at the time the BRAC decision was made (i.e., with FLW as a fully-operational military installation). This environmental baseline is used as a benchmark against which the impacts associated with the Army's proposed BRAC implementation plan and related alternative plans are evaluated. The impacts associated with the continuation of ongoing mission activities at FLW have been evaluated in previous NEPA documents (FLW, 1995c and FLW, 1996e), and will not be duplicated in this EIS.

For the reasons noted above, the No Action Alternative will not be evaluated further in Section 5 of this EIS. However, the environmental baseline (as referenced above, and defined in Section 4) is used as a basis for identification of impacts associated with the planned relocation of the Military Police School and Chemical School to FLW.

### 3.3.2 Comparative Description of Training Implementation Alternatives

The process used to develop training implementation alternatives to be evaluated in detail in the EIS is described in subsection 3.2.1 above. A comparative description of the intent of each of these training alternatives is provided below.

**3.3.2.1 Relocate Current Practice (RCP) Alternative.** The RCP Alternative evaluates relocating all Military Police School and Chemical School training methods to FLW as they are currently (at the time of the BRAC decision) conducted at FMC. This approach would be easiest for the Military Police School and the Chemical School since minimal effort would be required to develop, test and revise Programs of Instruction (POIs) that are used to define all training activities. This alternative also serves as a benchmark to help identify and evaluate alternative methods to train, and the operational and environmental implications of these alternative methods.

**3.3.2.2 Optimum Training Method (OPTM) (Army's Proposed Training Action) Alternative.** The OPTM (Army's Proposed Action) Alternative was formulated to identify and evaluate the impact of implementing the training methods which best met a combination of environmental criteria and operating efficiency criteria as documented in Volume IV of the EIS. Based on this formulation approach, the use of the OPTM (Army's Proposed Action) Alternative training methods (in all of the training goals), when compared to the RCP Alternative, might be expected to:

- provide improved operational readiness through streamlined or improved training procedures;
- offer cost savings over current training methods with no decrease in operational effectiveness;
- reduce or eliminate negative environmental or economic impacts associated with the RCP Alternative methods; and/or
- increase the positive benefits associated with training actions through the use of new technology or the potential synergistic effects of training engineer, military police and chemical specialists at the same location.

A review of Volume IV will indicate that for 42 of the 44 training methods evaluated, the OPTM represents the training method that received the highest total relative score for the six environmental and the six training and operating criteria. The two training methods which form the exceptions include: TG 7.2 Obscurant, Employment Operations Basic (Static) and TG 7.4 Obscurant, Employment Operations (Field Training Exercises). The rationale for those two exceptions is provided below:

- Implementation of the training method which received the highest total score for TG 7.2 would require that static training be conducted using a water manifold on the pulse-jet style generators and a fog oil recycling manifold on the turbine style generators. Both of these manifolds are newly fielded and long-term maintenance data on these manifolds is not available. Although technically possible, questions as to the long-term reliability of these newly fielded manifolds, and difficulties in training in winter precluded its selection as the OPTM. Nevertheless the use of these manifolds in static training has been evaluated for environmental impacts, in Section 5 of the EIS, as part of the Environmentally Preferred Training Method (EPTM). Once the manifolds have been fielded throughout the Army, and long-term reliability and maintenance data are available, the Chemical School will review the potential of implementing their use in static training.

- Implementation of the training method which received the highest total score for TG 7.4 would require a reduction in fog oil use for this training method from the Army's Proposed Action (OPTM) which would use up to 64,000 gallons per year to either up to 29,000 gallons per year or up to 44,000 gallons per year. The reduced fog oil usage offered by these two alternatives would require the use of computer simulation systems. Although such systems could be developed and the alternatives are technically possible, existing simulation systems are not capable of adequately replicating obscurant employment principles in a field environment. Therefore, implementation of these methods without the computer simulation systems is not possible. The environmental impacts of implementing mobile training with 29,000 gallons per year will be evaluated in Section 5 of the EIS as part of the EPTM Alternative, even though the Army was unable to select this method for the OPTM. If simulation equipment that can adequately replicate

obscurant employment principles in a field environment is developed in the future, the Chemical School will review the potential for implementing its use in field training.

**3.3.2.3 Environmentally Preferred Training Method (EPTM) Alternative.** The EPTM Alternative was formulated to evaluate the impact of implementing the alternative training methods that were determined to be viable as a result of the initial training alternatives screening process, and which received the highest score under the initial environmental screening criteria that were used to formulate the EIS alternatives. It would be expected that implementation of this alternative would provide the highest possible degree of protection to the environment at FLW, while still meeting the legislative requirement to relocate the Military Police School and Chemical School to FLW. However, this alternative would not be expected to provide for the same degree of training proficiency and/or operating efficiency as either the RCP or OPTM (Army's Proposed Action) Alternatives. The extent of the difference in environmental impacts in relation to each of the three training implementation alternatives are identified in Section V.

### 3.3.3 Presentation of Training Activity Groups

This subsection describes specific actions that are required to implement each of the 43 training goals that define the activities of the Military Police School and Chemical School, and the differences that occur under each implementation alternative. It should be noted that four general rules have been used in developing subsections 3.3.3.1 through 3.3.3.11:

1) The presentation of each training goal begins by describing the objective of the training to occur, and a description of related training activities. These descriptions are common to each implementation alternative.

2) In those cases where one or more of the three implementation alternatives (RCP, OPTM (Army's Proposed Action) and/or EPTM Alternative) are identical, the description of the identical training alternatives have been combined into a single description.

3) In those cases where the RCP, OPTM (Army's Proposed Action) or EPTM Alternative have elements in common, the descriptions of the OPTM (Army's Proposed Action) Alternative and the EPTM Alternative only specify the differences between those training methods and the RCP Alternative.

4) The descriptions of training alternatives generally do not identify the location where training activities will occur since the location of training and/or supporting facility development is dependant on the land use and facility plan alternative that is being considered. Information regarding the location of planned facilities and training activities under each land use and facility plan is provided in subsection 3.4, Supporting Facility Alternatives.

More detailed information on each of the specific training methods, the process used to develop the alternatives, and alternative training methods that were considered and evaluated through initial screening procedures but not selected for detailed analysis is located in Volume IV (Table IV.2), *Identification and Screening of Alternatives to Accomplish Training Goals at Fort Leonard Wood.*

Finally, before proceeding with the presentation of training alternatives, Table 3.1 has been provided to help orient the reader to the information presented, and provide a cross-reference to each training activity group and related training goal alternatives. This table has been designed to facilitate reference to items that are of interest to the reviewer and provide an overview of the structure of the training alternatives presentation. Notations used in the table include:

- "**R**" for Relocate Current Practice (RCP) Alternative;
- "**O**" for Optimum Training Method (OPTM) (Army's Proposed Action) Alternative; and
- "**E**" for Environmentally Preferred Training Method (EPTM) Alternative.

Footnotes referenced in the table are provided in the *Legend* at the conclusion of the table.

**Table 3.1: List of Training Activity Groups, Training Goals, Section 3 Cross-Reference, and Relationship of Training Mission Alternatives**

| Training Activity Group (TAG) or Training Goal (TG) | Section 3 Cross-Reference | Relationship of RCP, OPTM (Army's Proposed Action) and EPTM Alternatives [1] | | |
|---|---|---|---|---|
| | | RCP [2] | OPTM [3] | EPTM [4] |
| **TAG No. 1 - Battlefield Procedures** | | | | |
| TG 1.1 Call-For-Fire Support | See 3.3.3.1.1, Page 3-12 | R | Same as RCP | Same as RCP |
| TG 1.2 Maneuver Operations | See 3.3.3.1.2, Page 3-13 | R | Same as RCP | Same as RCP |
| TG 1.3 Mines and Obstacles to Prevent Movement | See 3.3.3.1.3, Page 3-14 | R | O | Same as OPTM |
| TG 1.4 Nuclear, Biological and Chemical (NBC) Warning and Reporting System | See 3.3.3.1.4, Page 3-14 | R | Same as RCP | Same as RCP |
| TG 1.5 Night-Time Squad Engagement | See 3.3.3.1.5, Page 3-15 | R | Same as RCP | Same as RCP |
| TG 1.6 Unarmed Self-Defense | See 3.3.3.1.6, Page 3-15 | R | Same as RCP | Same as RCP |
| TG 1.7 Urban Terrain | See 3.3.3.1.7, Page 3-15 | R | Same as RCP | Same as RCP |
| TG 1.8 Warfighting and Tactical Operations | See 3.3.3.1.8, Page 3-16 | R | Same as RCP | Same as RCP |
| **TAG No. 2 - Biological Agent Detection** | | | | |
| TG 2.1 Biological Integrated Detection System (BIDS) Battlefield Employment and Operation | See 3.3.3.2.1, Page 3-16 | R | Same as RCP | Same as RCP |
| TG 2.2 BIDS Maintenance | See 3.3.3.2.2, Page 3-17 | R | O | Same as OPTM |
| TG 2.3 Long Range Standoff Detection System (LR-BSDS) Battlefield Employment and Operation | See 3.3.3.2.3, Page 3-17 | R | Same as RCP | Same as RCP |
| TG 2.4 LR-BSDS Maintenance | See 3.3.3.2.4, Page 3-18 | R | Same as RCP | Same as RCP |
| **TAG No. 3 - Nuclear, Biological and Chemical (NBC) Reconnaissance Operations** | | | | |
| TG 3.1 FOX Battlefield Employment and Operations | See 3.3.3.3.1, Page 3-18 | R | Same as RCP | Same as RCP |
| TG 3.2 FOX Maintenance | See 3.3.3.3.2, Page 3-19 | R | O | Same as OPTM |
| **TAG No. 4 - General Military Training** | | | | |
| TG 4.1 General Military Training | See 3.3.3.4.1, Page 3-20 | R | Same as RCP | Same as RCP |
| TG 4.2 General Military Training, Field Training | See 3.3.3.4.2, Page 3-20 | R | Same as RCP | Same as RCP |

**Table 3.1: List of Training Activity Groups, Training Goals, Section 3 Cross-Reference, and Relationship of Training Mission Alternatives**

| Training Activity Group (TAG) or Training Goal (TG) | | Section 3 Cross-Reference | Relationship of RCP, OPTM (Army's Proposed Action) and EPTM Alternatives [1] | | |
|---|---|---|---|---|---|
| | | | RCP [2] | OPTM [3] | EPTM [4] |
| TG 4.3 | General Military Training, NBC Personal Protective Equipment | See 3.3.3.4.3, Page 3-21 | R | Same as RCP | E |
| TG 4.4 | Signals and Other Non-Verbal Forms of Communication | See 3.3.3.4.4, Page 3-21 | R | Same as RCP | E |
| TG 4.5 | Radio Communications, Including Secure Communications | See 3.3.3.4.5, Page 3-22 | R | Same as RCP | E |
| TG 4.6 | Computer Operations | See 3.3.3.4.6, Page 3-22 | R | O | Same as OPTM |
| TG 4.7 | Physical Fitness and Total Fitness | See 3.3.3.4.7, Page 3-23 | R | Same as RCP | Same as RCP |
| **TAG No. 5 - Military Police Operations** | | | | | |
| TG 5.1 | Basic Military Police Functions | See 3.3.3.5.1, Page 3-23 | R | Same as RCP | Same as RCP |
| TG 5.2 | Advanced Law Enforcement and Operations Other-Than-War | See 3.3.3.5.2, Page 3-24 | R | Same as RCP | Same as RCP |
| **TAG No. 6 - Nuclear, Biological and Chemical (NBC) Procedures** | | | | | |
| TG 6.1 | NBC Procedures | See 3.3.3.6.1, Page 3-24 | R | O | Same as OPTM |
| TG 6.2 | NBC Equipment | See 3.3.3.6.2, Page 3-25 | R | Same as RCP | Same as RCP |
| TG 6.3 | NBC, Decontamination, Advanced Proficiency Test (Toxic Agent) | See 3.3.3.6.3, Page 3-26 | R | O | Same as OPTM |
| TG 6.4 | NBC, Survival Recovery | See 3.3.3.6.4, Page 3-27 | R | O | Same as OPTM |
| **TAG No. 7 - Obscurant (Smoke) Procedures** | | | | | |
| TG 7.1 | Obscurant, Employment Principles | See 3.3.3.7.1, Page 3-29 | R | Same as RCP | Same as RCP |
| TG 7.2 | Obscurant, Employment Operations Basic (Static) | See 3.3.3.7.2, Page 3-30 | R | O | E |
| TG 7.3 | Obscurant, Employment Proficiency Test (Mobile Operations) | See 3.3.3.7.3, Page 3-31 | R | O | Same as OPTM |
| TG 7.4 | Obscurant, Employment Proficiency Test (Field Training Exercises) | See 3.3.3.7.4, Page 3-32 | R | O | E |
| TG 7.5 | Obscurant, Generator Maintenance | See 3.3.3.7.5, Page 3-34 | R | O | Same as OPTM |
| TG 7.6 | Obscurant, Storage Operations | See 3.3.3.7.6, Page 3-34 | R | O | E |
| **TAG No. 8 - Radiation Safety** | | | | | |
| TG 8.1 | Radiation Safety | See 3.3.3.8.1, Page 3-35 | R | O | E |
| TG 8.2 | Radiation, Test and Operational Equipment Storage | See 3.3.3.8.2, Page 3-36 | R | Same as RCP | Same as RCP |
| **TAG No. 9 - Research Support** | | | | | |

**Table 3.1: List of Training Activity Groups, Training Goals, Section 3 Cross-Reference, and Relationship of Training Mission Alternatives**

| Training Activity Group (TAG) or Training Goal (TG) | Section 3 Cross-Reference | Relationship of RCP, OPTM (Army's Proposed Action) and EPTM Alternatives [1] | | |
|---|---|---|---|---|
| | | RCP [2] | OPTM [3] | EPTM [4] |
| TG 9.1 Research Support | See 3.3.3.9.1, Page 3-36 | R | O | Same as OPTM |
| TG 9.2 Library, Specialized/Classified Information and Museum Artifacts | See 3.3.3.9.2, Page 3-37 | R | O | Same as OPTM |
| **TAG No. 10 - Small Arms Procedures** | | | | |
| TG 10.1 Weapons Training | See 3.3.3.10.1, Page 3-37 | R | Same as RCP | E |
| TG 10.2 Weapons Training, Pistol | See 3.3.3.10.2, Page 3-38 | R | Same as RCP | Same as RCP |
| TG 10.3 Weapons Storage | See 3.3.3.10.3, Page 3-39 | R | Same as RCP | Same as RCP |
| **TAG No. 11 - Vehicle Operations** | | | | |
| TG 11.1 Vehicle Operations, Driver Qualification | See 3.3.3.11.1, Page 3-39 | R | O | Same as OPTM |
| TG 11.2 Evasive Driving | See 3.3.3.11.2, Page 3-40 | R | Same as RCP | E |
| TG 11.3 Vehicle Maintenance Training | See 3.3.3.11.3, Page 3-40 | R | O | Same as OPTM |

Legend:
1 See Section 3.2.1 for discussion regarding the formulation of training alternatives and references to supporting documentation.
2 Relocate Current Practice Alternative
3 Optimum Training Method Alternative (Army's Proposed Training Action)
4 Environmentally Preferred Training Method Alternative
R Alternative based on conducting training for particular Training Goal (TG) at FLW in the same manner that it is currently conducted at Fort McClellan.
O Designates that the OPTM Alternative (Army's Proposed Action) for particular TG is different than the RCP Alternative.
E Designates that the EPTM Alternative for particular TG is different than the RCP Alternative and/or the OPTM Alternative.

*Source: Harland Bartholomew & Associates, Inc.*

## 3.3.3.1 Battlefield Procedures (Training Activity Group No. 1)

### 3.3.3.1.1 Call-For-Fire Support (Training Goal 1.1)

- **Objective.** To ensure accurate target acquisition, identification, location and timing of call-for-fire support.

- **Training Activities.** This training activity includes general classroom instruction in the coordination of artillery or air fire support to a designated location, at a designated time for either defensive or offensive support.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative (which is the same for the RCP, OPTM (Army's Proposed Action) and EPTM Alternative) includes

general classroom instruction, and use of an applied instruction 35 mm projection facility. The training requirements for the Military Police School and Chemical School under this training goal are very similar to ongoing training activities currently conducted by the Engineer School at FLW.

#### 3.3.3.1.2 Maneuver Operations (Training Goal 1.2)

- **Objective.** To ensure personnel understand the principles involved with planning, coordinating and controlling tactical movement of troops, vehicles, aircraft and equipment on a battlefield. This movement is conducted as part of either defensive or offensive military operations.

- **Training Activities.** This training activity includes instruction in the coordination, control and movement of personnel, vehicles and equipment.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative (same for all three training implementation alternatives) includes the use of a general instruction classroom, followed by the use of field/maneuver areas and simulators. The use of simulators allows students to obtain and demonstrate skill during controlled battlefield scenarios in which student team members coordinate their actions. The simulators allow for development of large-scale wartime scenarios that can not be easily replicated in field/maneuver training alone. Field/maneuver training however is required to provide training in a more realistic environment involving day and night operations, weather impacts, and a degree of isolation from other activities. The training requirements for the Military Police School and Chemical School in this training objective are very similar to the existing ongoing activities for the Engineer School.

#### 3.3.3.1.3 Mines and Obstacles to Prevent Movement (Training Goal 1.3)

- **Objective.** To ensure personnel know how to fortify defensive positions; how to impede the progress of aggressor forces or direct them into positions advantageous to U.S. and allied forces; and methods of breaching enemy obstacles to movement.

- **Training Activities.** This training activity includes the use, placement, location, neutralization, camouflage, explosion and demolition of both flame field expedient (FFE) deterrents and pre-manufactured (issue) mines; and the use, placement, location, neutralization, and camouflage of other obstacles designed to hinder movement. Flame field expedient deterrent training involves the use of normally available fuels (and explosives required to detonate these fuels) to construct FFE deterrents. Training on pre-manufactured mines includes claymore and other issue mines. Other obstacles to movement include the use of natural barriers, tank traps, concertina wire and similar items.

- **RCP Alternative.** This training alternative includes:

  - general classroom instruction,
  - followed by field training, including demonstration of issue and FFE deterrents, and other obstacles designed to prevent or hinder movement.

  As part of the current training practice personnel are instructed on the placement of issue mines, FFE deterrents, barbed wire and other items designed to prevent or limit movement by opposing forces. These items will be continued under each implementation alternative. This training is very similar to that currently performed at FLW, although the number of class iterations per year and the amount of fuel used in the training will be much larger with the addition of the Chemical School training requirements. The bulk fuels used of the FFE training will be kept in a designated area specifically designed for their storage. The storage area will include secondary spill containment to prevent the release of any spilled fuel into the environment.

Under the RCP Alternative approximately 900 gallons of "thickened" fuel are used for each training class. The fuel is used to demonstrate four types of expedient measures which are described in detail in Volume IV of the EIS. All four methods are taught in each training class and approximately 41 classes are conducted each year. Therefore, this training alternative will use approximately **36,900 gallons** of thickened fuel per year.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM alternatives are very similar to the RCP Alternative, except these alternatives:

  - reduce the amount of fuel used in FFE deterrent training;
  - augment the field training with professionally-developed video tapes that would illustrate the magnitude and physical characteristics of the explosions;
  - include the design and construction of a protective barrier under the expedient wall-of-flame training area to reduce the potential for unburned fuel to contaminate surface or groundwater;
  - include earthen berms around the total FFE deterrent training site to prevent upstream surface water from running across the training area; and
  - include clay-lined collection ponds to gather and hold runoff that occurs within the bermed flame training area.

  It is estimated that this training alternative would reduce the thickened fuel requirement by approximately 40 percent to approximately 550 gallons per class. Approximately 41 classes are taught per year. Therefore, this alternative reduces annual fuel consumption to approximately **22,550 gallons**. Further definition of this training activity is provided in Volume IV of the EIS.

#### 3.3.3.1.4 Nuclear, Biological and Chemical (NBC) Warning and Reporting System (Training Goal 1.4)

- **Objective.** To ensure personnel know how to use defensive command, control and communication procedures, and know what would be required if NBC weapons were employed by an enemy.

- **Training Activity.** This training activity includes classroom instruction on the detection, identification, tracking, decontamination and defense against NBC weapons in a battlefield environment.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - general classroom instruction;
  - the use of computer simulators to obtain and demonstrate command, control and communications skills during a controlled battlefield scenario; augmented by
  - field/maneuver training exercises where students in chemical protective clothing perform decontamination procedures on personnel and equipment. This activity is limited to the use of simulated (non-lethal) agents. Additional information concerning the type and amounts of simulants used is provided in the discussion of TG 1.4, in Volume IV, Table IV.2

  The computer simulators also allow for the demonstration of weather effects on potential NBC environments and movement of the area of potential contamination across the battlefield. The use of these computer simulated scenarios also allows teams of students to coordinate their team's actions with other teams. This training reinforces for the students the types of difficulties that they might encounter on the battlefield. This training requirement for the Military Police School and Chemical School is very similar to existing ongoing activities for the Engineer School; however, the extent of this training activity will be increased to meet the training needs of the Chemical School.

#### 3.3.3.1.5 Night-Time Squad Engagement (Training Goal 1.5)

- **Objective.** To develop operational procedures for use during night-time engagements and to understand the potential advantages that night-time operations offer.

- **Training Activity.** This training activity includes instruction on night-time squad engagement and battlefield procedures using small arms (such as rifles and pistols).

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - classroom instruction to introduce students to the principles involved, followed by
  - the use of the Firearms Training Simulator (FATS), and further developed by
  - the use of live-fire ranges.

  This requirement for military police and chemical training is very similar to the existing ongoing activities of the Engineer Center and FLW; however, the Engineer Center/FLW does not yet have FATS to augment the classroom and live-fire range training.

#### 3.3.3.1.6 Unarmed Self-Defense (Training Goal 1.6)

- **Objective.** To ensure that personnel have the proper knowledge of both offensive and defensive movements that they may employ against an opponent in a hand-to-hand combat situation.

- **Training Activity.** This training activity includes instruction in unarmed self-defense and hand-to-hand combat techniques.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - classroom instruction in the principles of self-defense and hand-to-hand combat, further developed and demonstrated by .
  - self-defense training in teams of two on padded mats in a gym, and
  - for hand-to-hand combat training in exterior training areas.

  Hand-to-Hand combat training for Military Police School and Chemical School students is very similar to the existing ongoing activities for the Engineer Center and FLW. The principles of self-defense being taught are directed to unique military police actions, which are not taught by the Engineer Center/FLW. However, the military police unit currently stationed at FLW does complete refresher and more advanced training in this unique skill area.

#### 3.3.3.1.7 Urban Terrain (Training Goal 1.7)

- **Objective.** To ensure that personnel and units are able to function in urbanized terrain as well as more traditional rural environments.

- **Training Activity.** This training activity includes instruction on the proper methods for conducting military operations in an urbanized terrain *using mock facilities*, including proper methods to conceal an approach to, enter and secure buildings; and how to patrol an urbanized area.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - classroom instruction, followed by

- development and demonstration of their skills at a specifically designed Military Operations in Urbanized Terrain (MOUT) facility developed to support this type of training.

The requirements for military police and chemical training for this objective are very similar to the existing ongoing activities for the Engineer Center. However, the military police training is more extensive, and will require construction of a new facility.

#### 3.3.3.1.8 Warfighting and Tactical Operations (Training Goal 1.8)

- **Objective.** To ensure that personnel understand warfighting principles, understand the potential interplay of various independent actions in a war time environment, and understand the importance and requirements for clear, concise, accurate, and timely communications.

- **Training Activity.** This training activity includes instruction on the proper command, control and communications methods for conducting tactical offensive and defensive military operations.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This alternative involves:

  - classroom instruction to introduce students to the principles involved, followed by
  - the use of the computer simulators to allow students to gain and demonstrate skills during controlled battlefield scenarios, augmented by
  - the use of live-fire ranges and maneuver areas.

The requirements for military police and chemical training for this objective are very similar to the existing ongoing activities for the Engineer Center and FLW.

## 3.3.3.2 Biological Agent Detection (Training Activity Group No. 2)

#### 3.3.3.2.1 Biological Integrated Detection System (BIDS) Battlefield Employment and Operation (Training Goal 2.1)

- **Objective.** To ensure that personnel understand the operation of the BIDS equipment, and how to most effectively employ BIDS equipment. BIDS instruments are designed to help identify the potential presence of biological agents on a battlefield, thereby providing early warning to U.S. and allied forces so that proper defensive measures may be employed to limit the potential for contamination.

- **Training Activity.** This training activity includes instruction on the use, employment and operation of the BIDS. The BIDS consists of a lightweight, multipurpose shelter, mounted on the rear of a high mobility multipurpose wheeled vehicle (HMMWV) which tows a 15 KW generator. The shelter contains all of the sampling and detection equipment. There is also a HMMWV with trailer that is used in a supporting role. Using the equipment and *biological materials that simulate biological agents*, students will be trained on the detection and identification of biological agents. *Biological materials that simulate biological agents* include: (1) *Bacillus subtilus* var. niger (BG); (2) *Kaolin Dust*; (3) Male specific (MS2) *Coliphage*; (4) *Erwinia herbicola*; and (5) *Ovalbumin.* Additional information concerning the type and amounts of *biological materials that simulate biological agents* is located in the discussion of TG 2.1, in Volume IV, Table IV.2. The materials are naturally occurring bacteria, clay and proteins. The materials, as described in Volume III, Appendix B, are used in relatively small quantities and are not toxic or pathogenic. Instruction will also include information on the potential impacts of biological weapons and the sensitivity of equipment to detecting these organisms. Students will also be trained on available communications equipment, driving and setting up the system, interpretation of meteorological

data, navigation using the Global Positioning System (GPS), and the use of personal protective equipment while taking and analyzing samples.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - classroom instruction, followed by
  - use of a BIDS simulator, and
  - field training.

  This alternative will involve the use of a small quantity of biological materials that simulate biological agents. These materials are used in order to train students on the use of the detection system and during the field training exercise to validate the students' proficiency in an operational environment. Simulants used in BIDS training are listed in Volume III, Appendix B, and Volume IV of the EIS.

#### 3.3.3.2.2 BIDS Maintenance (Training Goal 2.2)

- **Objective.** To ensure that personnel understand the proper maintenance procedures to use on the equipment contained in the BIDS equipment package.

- **Training Activity.** This training activity includes instruction on the proper methods for maintaining the BIDS, including the HMMWV on which it is mounted.

- **RCP Alternative.** This training alternative involves:

  - classroom instruction, followed by
  - use of typical pieces of equipment in the classroom to demonstrate general operator maintenance procedures (on a limited number of the internal components),
  - use of a BIDS to demonstrate operator maintenance on the HMMWV and trailer at a parking area near the classroom, followed by
  - hands-on maintenance at a maintenance bay (as required) to illustrate more detailed operator maintenance procedures.

  Vehicle maintenance training requirements for the Chemical School in this training objective are very similar to the existing ongoing activities for the Engineer School training requirements for other pieces of equipment.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This alternative is identical to the RCP Alternative, except that this limits exterior training to exterior areas that have controlled stormwater collection to prevent the inadvertent runoff of stormwater that might be contaminated by inadvertently spilled petroleum, oil and lubrication (POL), and hydraulic fluid products.

#### 3.3.3.2.3 Long Range Biological Standoff Detection System (LR-BSDS) Battlefield Employment and Operation (Training Goal 2.3)

- **Objective.** To ensure that personnel understand the employment and operation of this equipment package. The LR-BSDS provides a long-range large-area aerosol detection, tracking, and mapping capability. The instruments in the package are designed to help identify the potential presence of biological agents on a battlefield, thereby providing early warning to the U.S. and allied forces so that proper defensive measures may be employed to limit the potential for contamination. The LR-BSDS consists of an equipment package that is designed to be mounted in a UH-60 helicopter.

- **Training Activity.** This training activity includes instruction on the use, employment and operation of the LR-BSDS, however the system *will not be operated at FLW.* Training will focus on the operation, maintenance, installation and removal, and troubleshooting of the LR-BSDS; detection, discrimination and reporting of aerosol clouds; coordination of logistical support for LR-BSDS; UH-60 familiarization and safety features. General biological warfare subjects include discussion concerning biological warfare cloud movement and behavior characteristics, and standoff (from a distance) detection operations.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - classroom instruction, followed by
  - use of a LR-BSDS simulator during controlled scenarios, and
  - use of a UH-60 Blackhawk rotary wing aircraft (helicopter) mock-up to practice loading and unloading of the equipment.

  Under this training alternative, training will occur in the classroom and simulator. Actual field training with an operational LR-BSDS will occur at the unit's home station, not at FLW; therefore, no laser sightings will occur at FLW. Additionally as training will consist of classroom instruction of the theory behind the system, and an introduction to the equipment, no simulants are expected to be used during this portion of the training. Training on the detection of biological agents using the equipment will be conducted through a computerized system which is part of the LR-BSDS simulator.

#### 3.3.3.2.4 Long Range Biological Standoff Detection System (LR-BSDS) Maintenance (Training Goal 2.4)

- **Objective.** To ensure that personnel understand the proper maintenance procedures to use on the equipment contained in the LR-BSDS equipment package.

- **Training Activity.** This training activity includes instruction on the maintenance of the LR-BSDS. Training will focus on the maintenance and troubleshooting for the LR-BSDS and coordination of logistical support for the LR-BSDS.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - classroom instruction, followed by
  - use of typical pieces of equipment in the classroom to demonstrate general operator maintenance procedures on (a limited number of the internal components),
  - use of a LR-BSDS to demonstrate operator maintenance in a training area near the classroom, followed by
  - hands-on maintenance at a maintenance bay (as required) to illustrate more detailed operator maintenance procedures.

## 3.3.3.3 Nuclear, Biological and Chemical (NBC) Reconnaissance Operations (Training Activity Group No. 3)

#### 3.3.3.3.1 FOX Battlefield Employment and Operation (Training Goal 3.1)

- **Objective.** To ensure that personnel understand the operation of the M93 Nuclear, Biological and Chemical (NBC) Reconnaissance System FOX vehicle, and that they are able to effectively employ the system when needed. The FOX vehicle is designed to allow the operators to test air

and soil samples for the presence of chemical agents that might have been employed by enemy forces. If chemical agents are present, the vehicle operators are able to mark the area with flags so that "friendly" force personnel are able to use proper personal protective equipment and/or avoid the area.

- **Training Activity.** This training activity includes instruction on the use, employment capabilities and operation of the FOX vehicle and chemical detection system, using *simulated chemical agents*. The simulated chemical agents will be used in both interior and exterior training environments. The simulants are used in small quantities and under controlled conditions, and have low toxicity levels. The chemical simulants do not biomagnify and are attenuated by the environment quickly, because they are readily degraded by microbes, are volatile, photodecompose, and are quickly metabolized and/or readily excreted. The FOX is a self-contained vehicle capable of operation on both land and in an amphibious environment, although amphibious training is limited to driver operations only. Vehicle operations training will include day-time operations and night-time operations, including the use of night-vision goggles.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - classroom instruction, followed by
  - use of the FOX simulator scenarios, augmented by
  - field/maneuver area training.

  This training activity includes instruction on the use, employment capabilities and operation of the FOX vehicle and chemical detection system, using simulated chemical agents. Simulants used in FOX training are listed in Volume III, Appendix B and in Volume IV of the EIS.

  Training while in the simulators consists of allowing the fumes of simulants to escape near the FOX chemical detection equipment and then recapping the simulant container for each chemical after the chemical has been detected using the equipment in the simulator.

  Training while in a field environment consists of using approximately one quart of diluted simulant (diluted one part simulant to ten parts water) in shallow reusable trays. A shallow pit is dug into the road surface and a reusable tray containing approximately 40 pounds of sand is placed in the pit. The simulant solution is then poured into the tray of sand and the FOX vehicle with it's onboard detection equipment is driven over the area. Following the completion of the training, the container filled with sand (and any remaining diluted simulant) is recovered for reuse in future training exercises. Some training is also done by allowing the fumes of simulants to escape near the FOX chemical detection equipment and then recapping the simulant container. A total of approximately 30 liters of simulants are used annually in this field training. Amphibious (driver) training is performed, but simulants are *not* used during amphibious training.

#### 3.3.3.3.2 FOX Maintenance (Training Goal 3.2)

- **Objective.** To ensure that personnel understand and are able to perform maintenance on the FOX vehicle and the communications and test equipment that is contained in the vehicle.

- **Training Activity.** This training activity includes instruction on the proper methods vehicle operators should use for maintaining the FOX system and vehicle. Included in this instruction is information concerning the proper maintenance of the vehicle and the monitoring, testing and communication equipment mounted on the vehicle.

- **RCP Alternative.** This training alternative includes:

  - classroom instruction, followed by
  - use of typical pieces of equipment in the classroom to demonstrate general operator maintenance procedures on internal system components,
  - use of a FOX to demonstrate operator maintenance on the vehicle in a parking area near the classroom, followed by
  - hands-on maintenance at a maintenance bay (as required) to illustrate more detailed operator maintenance procedures.

  Vehicle maintenance training requirements for the Chemical School in this training objective are very similar to the existing ongoing activities for the Engineer Center and FLW training requirements for other pieces of equipment.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative varies from the RCP Alternative in that the use of vehicles for training in exterior training areas will be limited to areas that have controlled stormwater collection to prevent the inadvertent runoff of stormwater which might contain inadvertently spilled POL and hydraulic fluids.

## 3.3.3.4 General Military Training (Training Activity Group No. 4)

### 3.3.3.4.1 General Military Training (Training Goal 4.1)

- **Objective.** To ensure that personnel understand the operation of the military, what actions are expected, and what benefits may be expected as a result of actions. Additionally, this training concentrates on ensuring that each individual acquires basic skills that will be needed throughout their career.

- **Training Activity.** This training activity includes instruction in: Code of Conduct; oral and written communications; military customs and courtesies; first aid; leadership skills; military organizational structure and the proper use of the Chain-of-Command; preventive medicine and personal hygiene; military rights and responsibilities; military standards of conduct and personal behavior; time management; Total Army Quality; the Uniform Code of Military Justice; and an introduction to Military Law.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - classroom instruction, augmented by
  - training aids brought into the classroom to demonstrate the subject matter being discussed.

  Instruction in these areas is conducted in much the same manner as classes taught at civilian high schools or colleges. Individual classes may include either formal lectures, informal lectures, discussion sessions, informal working groups or a combination of each. General Military Training (GMT) requirements for military police and chemical school training are very similar to existing ongoing activities for the Engineer Center and FLW.

### 3.3.3.4.2 General Military Training, Field Training (Training Goal 4.2)

- **Objective.** In addition to the information presented under the objective described in subsection 3.3.3.4.1 (TG 4.1 General Military Training) above, this training concentrates on physical skills that each person must have.

- **Training Activity.** This training activity includes instruction in: drill and ceremony; defensive procedures; operational tactics; and land navigation (including global positioning systems, map reading, and field/maneuver exercises).

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes lectures in a general instruction classroom which are augmented by the development and demonstration of skill during additional field/maneuver training. GMT Training Field requirements for military police and chemical training are very similar to the existing ongoing activities for the Engineer Center and FLW. The field training areas required by the Military Police School and Chemical School will be collocated with the existing training areas at FLW.

#### 3.3.3.4.3 General Military Training, Nuclear, Biological and Chemical Personal Protective Equipment (Training Goal 4.3)

- **Objective.** To ensure that each individual is able to identify and put on their protective equipment, and work as a member of a decontamination team. NBC Personal Protective Equipment is designed to limit the potential for contamination in the presence of nuclear, biological or chemical agents on a battlefield.

- **Training Activity.** This training activity includes instruction in the proper maintenance and use of NBC Personal Protective Equipment. Equipment normally used in this training includes individual air filtration canisters; protective masks; battle dress overgarment chemical protective gear; chemical protective coveralls; and toxicological agent protective suits.

- **RCP and OPTM (Army's Proposed Action) Alternatives.** This training alternative includes:

  - classroom instruction, followed by
  - practice donning, doffing and fit testing the equipment, after which
  - students are placed into a CS chamber filled with CS (tear) gas to demonstrate the effectiveness of the protective equipment.

  The requirements for the military police and chemical training under this training objective are very similar to the existing ongoing activities for the Engineer Center and FLW. To the extent that the existing NBC training area at FLW has the requisite capacity to support additional training, the GMT NBC field training areas required by the Military Police School and Chemical School will be collocated with the existing training areas at FLW.

- **EPTM Alternative.** This training alternative varies from the RCP and OPTM (Army's Proposed Action) in that it does not include classroom instruction thereby eliminating the impacts associated with the construction of additional classrooms. This alternative involves:

  - instruction at an exterior training area, followed by
  - practice donning, doffing and fit testing the equipment, after which
  - students are placed into a CS chamber filled with CS (Tear) gas to demonstrate the effectiveness of the protective equipment.

#### 3.3.3.4.4 Signals and Other Non-Verbal Forms of Communications (Training Goal 4.4)

- **Objective.** To ensure that personnel are able to communicate when verbal communication is not possible or preferred.

- **Training Activity.** This training activity includes instruction in the proper methods for non-verbal forms of communications including hand and body signals; signaling with lights, flares, and flags; and non-verbal body gestures.

- **RCP and OPTM (Army's Proposed Action) Alternatives.** This training alternative includes:

  - classroom instruction, augmented by
  - instructor demonstrations, and
  - student exercises.

  The requirements for military police and chemical training under this objective are very similar to the existing ongoing activities for the Engineer Center and FLW. The additional training required by the Military Police School and Chemical School will be collocated with the existing training areas at FLW.

- **EPTM Alternative.** This training alternative varies from the RCP and OPTM (Army's Proposed Action) in that it does not include classroom instruction thereby eliminating the impacts associated with the construction of additional classrooms. This alternative involves the:

  - use of an exterior training area to provide general instruction, skill development, and skill demonstrations.

#### 3.3.3.4.5 Radio Communications, including secure communications (Training Goal 4.5)

- **Objective.** To ensure that personnel are able to use radio communication when direct verbal or non-verbal communication is not possible or preferred.

- **Training Activity.** This training activity includes instruction in the proper methods for both secure and non-secure radio communications. Instruction includes the use of radio systems; reading and writing as well as transmitting and receiving military messages; encoding and decoding messages including use of the Tactical Operations Code; and use of intercommunication sets and electronic countermeasures.

- **RCP and OPTM (Army's Proposed Action) Alternatives.** This training alternative involves:

  - classroom instruction, augmented by
  - use of a communications lab. The communications lab is equipped with radio equipment that is connected (via wire) to a control system.

  The requirements for military police and chemical training under this objective are very similar to the existing ongoing activities for the Engineer Center and FLW. The additional training required by the Military Police School and Chemical School will be collocated with the existing training areas at FLW.

- **EPTM Alternative.** This training alternative varies from the RCP and OPTM (Army's Proposed Action) Alternatives in that it does not include classroom instruction thereby eliminating the impacts associated with the construction of additional classrooms. This alternative involves instruction in an outdoor training area. Under this training alternative, students will be provided with individual field radios. Use of field radios which are battery powered will increase the usage of the non-recyclable batteries used by the Harris and SINGARS radio systems.

#### 3.3.3.4.6 Computer Operations (Training Goal 4.6)

- **Objective.** To ensure personnel have a basic understanding of computer systems and the software that they will be expected to use.

- **Training Activity.** This training activity includes instruction in the proper use of personal computers, including the use of both commercial and specifically designed software packages.

- **RCP Alternative.** This training alternative involves:

  - classroom instruction, augmented by
  - use of computer labs.

  Personal computers (PCs) at the Military Police School and Chemical School have resident software and operate independently of each other. In some cases this limits the value of training because the computer hardware is not advanced enough to facilitate effective use of the current software packages. Under the RCP Alternative individual computers will require modernization to expand their memory and increase random access memory (RAM).

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative is very similar to the RCP Alternative, however it includes the incorporation and use of a computer network with a centralized computer server. The centralized computer network will allow the computers to function more efficiently, without the need to update and expand the hard drives on the individual PCs. Modernization of the current PCs is required to allow them to efficiently operate with the number and types of programs that will be installed on them.

#### 3.3.3.4.7 Physical Fitness and Total Fitness (Training Goal 4.7)

- **Objective.** To reinforce the importance of personal health through exercise and preventative measures (such as reduced use of tobacco and alcohol products), and to ensure that all personnel are able to meet minimum personal fitness requirements.

- **Training Activity.** This training activity includes instruction on the U.S. Army Physical Readiness Program, including the performance of specified physical exercises. The Total Fitness program expands the physical fitness program to include instruction on: the importance of a regular physical training program and health benefits awareness; prevention of future medical problems through limiting personal use of tobacco, alcohol, and drugs; drug and alcohol abuse awareness training; and prevention of sexually transmitted diseases.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes:

  - classroom instruction, augmented by
  - development and demonstration of physical skills through both organized and individual physical training in gyms, training areas (and pole barns) and along fitness trails and installation roadways.

## 3.3.3.5 Military Police Procedures (Training Activity Group No. 5)

#### 3.3.3.5.1 Basic Military Police Functions (Training Goal 5.1)

- **Objective.** To instruct personnel on basic military justice issues including the use and enforcement of the Uniform Code of Military Justice and proper procedures to be used by military police personnel.

- **Training Activity.** This training activity includes instruction in arms room operations; confinement facility and enemy prisoner-of-war operations; crime scene investigations; crime scene response; domestic law enforcement; domestic violence including spouse and child abuse investigation and response; evidence chain-of-custody requirements; evidence storage; hostage negotiation; incident investigation; interview and interrogation of personnel; patrol procedures; physical security and crime prevention; protective services; Special Reaction Team (SRT)

operations; tactical response; counter-drug procedures; and counter-terrorism procedures. Training includes the use of actual and mock police equipment that will be issued for pedestrian and vehicle patrols, and fingerprinting equipment.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternative.** This training alternative includes the use of a general instruction classroom to provide instruction on background information and the principles to be used in military police operations. This training is followed by more specific training on the individual types of actions which may be required. Mock crime and investigation scenes are used to allow for development of specific skills that the individual will be required to have during actual patrol.

#### 3.3.3.5.2 Advanced Law Enforcement and Operations Other-than-War (Training Goal 5.2)

- **Objective.** To expand individual skills in basic military police operations and to ensure that students understand the full range of typical Operations Other-than-War to which personnel may be required to respond. Typical Operations Other-than-War include humanitarian disaster relief operations, peacekeeping operations, counter narcotics and civil disturbances.

- **Training Activity.** This training activity includes advanced training in the items included under TG 5.1, *Basic Military Police Functions*, plus more detailed instruction in Operations Other-than-War.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes lectures in a general instruction classroom which are augmented by training aids that are brought into the classroom to help demonstrate the subject matter being discussed. Students are also trained in mock training scenarios designed to resemble crime scenes.

## 3.3.3.6 Nuclear, Biological and Chemical Procedures (Training Activity Group No. 6)

#### 3.3.3.6.1 Nuclear, Biological and Chemical Procedures (Training Goal 6.1)

- **Objective.** To ensure that students understand the proper procedures to use following the release of NBC agents.

- **Training Activity.** This training activity includes instruction in NBC Accident Response and Base Recovery; NBC Contingency Support; and NBC Detection and Reconnaissance. Related to the objectives are required communications skills including the requirements for, and procedures to, notify the chain-of-command of potential and actual NBC incidents. Interpretation of meteorological data and atmospheric conditions is also included in the training.

- **RCP Alternative.** This alternative involves:

  - use of classroom instruction, followed by
  - more specific training on the individual types of NBC actions which may be required.

  The more specific training includes the use of small quantities of:

  - simulated chemical agents in both a lab/classroom environment and at exterior training areas, and
  - unsealed radiological isotope sources in a lab/classroom environment and at exterior training areas designated for training by the Chemical School Radiation Lab Health Physics Officer.

Chemical agent simulants are listed in Volume III, Appendix B and Volume IV of the EIS.

Radiological isotope use at interior and exterior training areas is conducted in accordance with the existing Nuclear Regulatory Commission (NRC) license at FMC. This license allows for the use of both sealed and unsealed radiological isotope sources in highly controlled interior and exterior training activities. The majority of radiation training takes place in carefully-controlled and monitored indoor laboratories. The radiation laboratories use small quantities of many isotopes. Most of these are equipment calibration sources or low-level radioactive laboratory sources. Isotopes most commonly used for this training are listed in Volume III, Appendix B and Volume IV of the EIS.

The Chemical School is also licensed to operate an outdoor alpha field at FMC, and one was constructed. However the outdoor field has never been used for training at FMC, and there are no plans to use the field in the future. The need to use unsealed radiological isotope sources in exterior training is very limited, and the effects of radiological fallout at high radiation levels may be effectively simulated through the use the AN/TDQ-T1(V) continuous wave radio transmitter. Even though the use of unsealed radiological isotope sources in exterior training has not been performed at FMC and is not anticipated to be a training requirement in the future at FLW, the RCP Alternative will include the ability for this training to occur, should the need arise. FLW will fully comply with NRC license requirements and restrictions.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This alternative is identical to the RCP Alternative except that it limits training with unsealed radiological isotopes to a classroom/laboratory environment. The training alternative will remove the ability to perform exterior training with unsealed radiological isotope sources currently allowed in the NRC license at FMC. As discussed above, the ability to use unsealed radiological isotope sources in an exterior training environment has never been performed at the FMC alpha field and there are no plans to implement this type of training. Consequently, the difference between the RCP Alternative and this alternative is a restriction of training to a greater extent than is currently called for in the existing NRC license at FMC.

  The use of chemical simulants and sealed radiological sources (as called for in the RCP Alternative) would remain unchanged in this alternative.

#### 3.3.3.6.2 Nuclear, Biological and Chemical Equipment (Training Goal 6.2)

- **Objective.** To ensure that students understand the proper operation and use of NBC detection and monitoring equipment.

- **Training Activity.** This training activity includes instruction in Equipment Decontamination; Personnel Decontamination; Personal Protective Equipment (including the items listed for TG 4.3 General Military Training, NBC Personnel Protective Equipment) use, donning, doffing and fit testing; and Protective Equipment Proficiency Test using a gas chamber filled with an irritant (CS - tear gas).

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This alternative includes:

  - classroom instruction, followed by,
  - instruction on the proper care, maintenance and use of NBC detection, identification and personnel/equipment decontamination equipment,
  - instruction on the proper use of the equipment at field/maneuver training areas, the Decontamination Apparatus Training Facility (DATF), and CS (tear) gas chamber.

  This training is conducted in normal uniforms and in full NBC personal protective equipment.

### 3.3.3.6.3 NBC, Decontamination, Advanced Proficiency Test (Toxic Agent) (Training Goal 6.3)

- **Objective.** To build confidence in individual chemical specialists that they have the required skills to detect and identify chemical agents; decontaminate and return to use equipment that may have been contaminated; and decontaminate themselves and their team members. Chemical specialists will develop confidence that their protective equipment will prevent them from being affected by the toxic agent.

- **Training Activity.** This training activity includes advanced proficiency demonstration in decontamination of personnel and equipment. Included in this training are refresher training on the proper use, care, and maintenance of personal NBC equipment; practice on proper donning and doffing procedures; practice on decontaminating personnel and equipment in a non-contaminated environment; and training in an area designed to simulate the floorplan of the actual toxic-agent training facility bays to allow a thorough pre-briefing to students on the procedures which will be followed during the toxic-agent training. The training uses simulants in lieu of toxic chemical agents during exterior training. Amyl acetate/stannic chloride *(simulated chemical agent)* is also used to validate the fit of the student's protective mask/equipment. *Toxic chemical agents* are also used in a controlled environment as part of the training. As part of the proficiency demonstration required to graduate from this training program, students must don and fit-test their personal protective equipment; correctly locate, identify and then decontaminate a piece of equipment as part of a decontamination team; and finally decontaminate themselves and members of their team.

- **RCP Alternative.** This training alternative includes:

  - classroom instruction designed to refresh and augment the information provided to all military personnel, and
  - sharpen the proficiency skill of Army chemical specialists, personnel from other military branches, services and civilian personnel by vividly demonstrating the effectiveness of chemical individual protective equipment and their skills at decontamination.

  This classroom training is followed by:

  - dress rehearsals in protective equipment in interior and exterior training areas,
  - introduction of a toxic-agent into a controlled interior training environment, after which
  - student teams then detect, identify and decontaminate a specific piece of equipment as part of their skill proficiency demonstration, followed by
  - decontamination of their protective equipment.

  This alternative will require construction of a facility at FLW similar to the existing Chemical Defense Training Facility (CDTF) at FMC. Under the RCP Alternative, this facility would include the construction of a Thermal Treatment Unit (TTU) to treat the non-hazardous wastes generated during training. All hazardous and medical/infectious wastes would be disposed of off-post in accordance with existing disposal procedures used at FLW.

  The toxic agent training will be conducted within a facility specifically designed for this type of training. Design features of the facility include: eight negative air pressure training bays; entry vestibules; visual monitoring systems; air monitoring systems which monitor air exhaust streams to ensure that agent does not exceed acceptable standards; and backup power systems which will provide electrical power during power outages. The facility design includes the ability to capture any water used for firefighting to prevent inadvertent contamination of the surrounding area. A 300-meter (radius) restricted security access buffer will also surround the facility to provide an extra level of physical security for the facility.

As stated in subsection 2.2, the Commission's recommendation specifically stated that the CDTF will continue to operate at FMC until such time as the capability to operate a replacement facility at FLW is achieved. Under all alternatives, it is anticipated that the CDTF will be designed and constructed as part of the total BRAC-related construction program, the timeframe for which is summarized in subsection 2.3.5. Therefore, it is anticipated that this facility will become operational at FLW during the same timeframe that all other military police and chemical training activities are implemented.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative is identical to the RCP Alternative except that decontaminated waste by-products from toxic agent training would be disposed of off-site. This would eliminate the requirement to construct and operate a TTU at the CDTF.

#### 3.3.3.6.4 Nuclear, Biological and Chemical, Survival Recovery (Training Goal 6.4)

- **Objective.** To ensure that personnel understand the procedures that will enhance and expedite survival recovery following an incident involving nuclear, biological or chemical weapons.

- **Training Activity.** This training activity includes instruction in survival recovery. Related to the objective is training on required communications skills including the requirements for and procedures to notify the chain-of-command. Interpretation of meteorological data and atmospheric conditions is also included in the training in order to allow personnel to identify and track potential areas of contamination.

- **RCP Alternative.** This alternative involves:

  - use of classroom instruction, followed by
  - more specific training on the individual types of NBC actions which may be required.

  This training will involve the use of the same radiological isotopes and chemical simulants that are used and discussed in TG 6.1. The majority of this training takes place in the classrooms and laboratories. The Chemical School at FMC is licensed to operate an outdoor alpha field by the NRC. Although this alpha field has been constructed, it has never been used for training and there area no plans to use the alpha field in the future.

  The need to use unsealed radiological isotope sources in exterior training is very limited, and the effects of radiological fallout at high radiation levels may be effectively simulated through the use of the AN/TDQ-T1(V) continuous wave radio transmitter. As discussed in training goals 6.1 and 8.1, even though the use of unsealed radiological isotope sources in exterior training has not been performed at FMC and there are no current plans to implement this type of training at FLW, the RCP Alternative includes the ability for this training to occur, should the need arise.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This alternative is identical to the RCP Alternative except that it limits training with unsealed radiological isotopes to a classroom/laboratory environment. The training alternative will remove the ability to perform exterior training with unsealed radiological isotope sources, as allowed in the NRC license at the FMC, although this type of training has never been performed at the FMC alpha field. All exterior training associated with this TG will use the AN/TDQ-T1(V) continuous wave radio transmitter.

## 3.3.3.7 Obscurant Procedures (Training Activity Group No. 7)

Implementation of TG 7.2, Obscurant, Employment Operations Basic (Static) (as discussed in subsection 3.3.3.7.2); TG 7.3, Obscurant, Employment Proficiency Test (Mobile Operations) (as discussed in

subsection 3.3.3.7.3); and TG 7.4, Obscurant, Employment Proficiency Test (Field Training Exercises) (as discussed in subsection 3.3.3.7.4) will involve the use of fog oil obscurants. The use of fog oil as an obscurant was a key issue in scoping comments and has been the basis of additional studies. As part of the initial effort for implementing the proposed action, the Army coordinated with and obtained a permit from the State of Missouri, Department of Natural Resources (MDNR) that would allow the Army to use up to 3,700 pounds (or approximately 481 gallons) of fog oil per day and up to 65,000 gallons of fog oil per year. At the time the permit was obtained, these limits were thought to accurately reflect Army training requirements. As part of the EIS analysis, it was determined that the initial fog oil training requirements identified by the Army erroneously omitted the Army Reserve personnel portion of fog oil training. Table 3.2 provides a summary of the fog oil training requirements (including Army Reserve training) for each of these training goals under each of the alternative training methods. Analysis of environmental consequences of using up to 84,500 gallons per year (as identified in the Army's Proposed Action (OPTM)) encompasses the anticipated environmental impacts associated with the currently permitted level of 65,000 gallons per year, thus 65,000 gallons per year was not analyzed separately. The use of smoke grenades and smoke pots is not included in the existing air permit issued for fog oil training. However, the Army intends to pursue, through a revised permit with MDNR, the use of smoke pots in association with fog oil training. FLW will coordinate with the MDNR to determine the most suitable course of action concerning either modification of the existing air quality permit or applying for a new permit. *However, under any circumstance, FLW will adhere to all permit conditions in effect at the time training occurs.*

**Table 3.2:**
**Fog Oil Requirements**

| Training Method | Training Goal 7.2, Static | Training Goal 7.3, Mobile Operations | Training Goal 7.4, Field Training Exercises | Total |
|---|---|---|---|---|
| RCP Alternative | 20,000 | 41,500 | 64,000 | 125,500 |
| OPTM Alternative | 8,500 | 20,000 | 56,000 | 84,500 |
| EPTM Alternative | 1,000 | 20,000 | 28,500 | 49,500 |

*Source: Harland Bartholomew & Associates, Inc*

If the existing air permit can be modified, other forms of obscurants (including smoke pots and grenades) would be used prior to generating fog oil obscurant to determine dispersion patterns, and smoke pots may also be used during fog oil generation to fill localized holes in the fog oil obscurant cloud. Both of these other forms of obscurants may also be used independently in small quantities. As currently planned, a maximum of 59 smoke pots per day may be used, with a maximum of 12 smoke pots used to augment training at any one location during one training event and a maximum of 24 used during two events that may be occurring at different locations on the installation at the same time. Smoke pots may be used either alone or to augment fog oil training. A maximum of 72 smoke grenades may also be used each day, with a maximum of 24 grenades used at a single site per day, and up to two grenades may be used at one time as long as the grenades are separated by a minimum of 150 meters. Smoke grenades are not used during fog oil obscurant training.

Fog oil training currently uses a petroleum based obscurant oil. Fog oils manufactured before 1986 typically had high concentrations of toxic and carcinogenic aromatics (Katz, 1980), and posed a potential health threat to exposed individuals. In 1986, military specifications for SGF-2, were altered to require the removal of carcinogens and potential carcinogens from the oil (DA, 1986a). Fog oil used at FLW will, at a minimum, comply with a newer specification (DA, 1995a) which requires manufacturers to certify the oils they produce show no evidence of carcinogenicity based on required testing.

Based on scoping comments, the EIS considered the potential for the use of non-petroleum based oils (such as vegetable oils). At the present time the use of these types of oils has not been determined to be

practicable. Initial investigations have indicated that it may be possible to use non-petroleum based fog oil for training. As discussed in subsection 1.4.6.5 and the Executive Summary of the EIS, the Army is reviewing the potential for the use of non-petroleum based fog oil. It is estimated that it may take 3 to 5 years for the Army to complete additional studies required to determine the effectiveness of non-petroleum oils in producing obscurant; to review potential maintenance impacts of using these oils on the obscurant equipment; the implications of using non-petroleum products during cold weather; potential implications of long-term storage of non-petroleum products; and the potential environmental impacts of using non-petroleum oils at FLW.

The reduced fog oil usage offered by the EPTM Alternative for TG 7.4, Obscurant, Employment Proficiency Test (Field Training Exercises) would require the use of computer simulation systems. Although such systems could be developed and the alternatives are technically possible, existing simulation systems are not capable of adequately replicating obscurant employment principles in a field environment. Therefore implementation of these methods without the computer simulation systems is not possible. Subsection 3.3.3.7.4 contains additional discussion concerning this issue. Training in a realistic military operational environment is critical to ensuring a thorough understanding of the effects of meteorological conditions and to train the selection of the proper obscurant and dispersion methods

During the permitting process, several key assumptions were made (i.e. particulate/volatile organic compound (VOC) fraction in ambient air, air dispersion model, ambient air monitoring data etc.). The Army has initiated additional studies and programs to evaluate and possibly refine these assumptions to better depict actual training conditions at FLW by the modeling simulations. Any subsequent refinement to these assumptions could alter the air quality analysis and will be documented when FLW requests renewal or modification of their existing prevention of significant deterioration (PSD) air quality permit. Based on the new modeling information that will be developed while pursuing a permit modification, FLW may be required to obtain offsets in PM-10 emissions from the existing baseline sources. FLW in coordination with MDNR might be required to:

1) Shut-down, reduce production rates or place air pollution controls for on-post PM-10 sources such as the rock crusher, asphalt plant, power plant or other on post facilities.
2) Negotiate with nearby off-post sources to shut-down, reduce production rates or place air pollution control devices on equipment. The area contains several large charcoal kilns, rock crushers and other sources of PM-10.
3) Establish additional restrictive meteorological conditions under which training scenarios can occur.

In the event that the information obtained pursuing the revised permit results in further restrictions, FLW will be required to pursue additional offsets in excess of those described above. They may also be required to incorporate additional permit conditions which further restrict the training.

#### 3.3.3.7.1 Obscurant , Employment Principles (Training Goal 7.1)

- **Objective.** To ensure that personnel understand how to most effectively use obscurants (smoke). This training provides an introduction to the types of obscurants available, the effectiveness of the different types of obscurants to block different detection systems, the effects of various meteorological conditions on obscurants, and a review of available generation systems to allow the selection of the proper obscurant and dispersion methods. The military employs obscurants principally to conceal or screen the movement of troops and vehicles. Obscurants have critical importance in neutralizing enemy sensors and hiding friendly forces and material. Smoke screens can also be used offensively for immobilizing enemy troops by clouding their vision.

- **Training Activity.** This training activity includes classroom training in the principles, goals and objectives of using obscurants.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This alternative includes:

    - lectures in a general instruction classroom concerning the tactical use of obscurants, types of obscurants available, and the anticipated performance of different obscurant methods under various meteorological conditions and against various types of detection,
    - augmented by training aids that are brought into the classroom to help demonstrate the subject matter being discussed.

#### 3.3.3.7.2 Obscurant, Employment Operations Basic (Static) (Training Goal 7.2)

- **Objective.** To ensure that personnel understand the operation of the obscurant generator systems.

- **Training Activity.** This training activity includes training in the basic operation of smoke generators and the use of other forms of obscurants (including smoke grenades and smoke pots). The use of other forms of obscurants for this training goal is limited to approximately one smoke grenade per class to verify weather conditions (wind speed, wind direction, and atmospheric stability class). Introductory information includes weather, equipment positioning requirements, practicality of using obscurants on the battlefield and types of obscurants. Also included in this area are the operation and operator/daily pre-start maintenance of the generator systems.

  Each of the alternatives for this TG include:

    - the use of general instruction classrooms to provide instruction on the goals and use of obscurants on the battlefield, followed by
    - the use of various types of generators and fog oil to demonstrate proper dispersion.

  Lecture material covers the proper pre-start procedures and proper methods of generating fog oil smoke using the smoke generator systems, along with the grenade-based obscurant systems installed on the Armored Security Vehicle and HMMWVs. Additional details regarding the type of equipment to be used is included in Volume IV of the EIS.

  Each of the alternative methods vary with regard to:

    - the length of training,
    - the type of facility used for the training, or
    - include the use of simulators to augment training.

- **RCP Alternative.** Under the RCP Alternative, each student will have the opportunity to operate each type of generator (M56 or M157) at a designated range for a minimum of 10 minutes. The starting procedures and characteristics for the M157 pulse jet generator that is cold (less than 600 degrees) and one that is hot (warmer than 600 degrees) are different requiring that students learn, demonstrate and exercise these starting procedures for a minimum of 10 minutes from a cold start and for 10 minutes from a hot start. The generators are located on concrete pads, with a collection system to collect water runoff and oil spills. Under the RCP Alternative, this element of fog oil obscurant training (static operations) will utilize up to **20,000 gallons** of fog oil per year.

- **OPTM (Army's Proposed Action) Alternative.** This training alternative is basically identical to the RCP Alternative, except that it:

    - replaces the use of a concrete roadway and spill collection system with new management practices that require students to clean up spills as they occur,
    - reduces the amount of time each student may operate the M56 generator system from approximately 10 minutes to approximately 5 minutes; and

- reduces the amount of time each student may operate the M157 generation system from a total of approximately 20 minutes to approximately 4 minutes including 2 minutes for a hot start and 2 minutes for a cold start.

This option is also better suited to the use of the new generating systems (as listed in Volume IV) to be used at FLW. The older management practice of using the concrete road and training pads was better suited to the M3A4 system which will not be used at FLW. Under the OPTM (Army's Proposed Action) Alternative, this element of fog oil obscurant training (static operations) will be reduced to up to **8,500 gallons** per year. This is a notable reduction in fog oil use as compared to the RCP alternative.

- **EPTM Alternative.** This alternative would provide unlimited time for practice starting and stopping each generator system through the:

  - use of an adapter on the M56 which collects the fog oil output and recycles it through the generator, resulting in reduced emissions, and
  - use of a "water manifold" on the M157 which allows the use of tap water to cool the engine rather than fog oil, resulting in reduced emissions.

To allow students to experience fog oil emissions and to demonstrate actual operation of the M56, each class would include the use of up to 3 gallons of fog oil without the collection adapter in place. Each Army class would also include 2 minutes of M157 operation with fog oil. This static training alternative would require use of less than 500 gallons of fog oil per year.

The pulse jet-based M157 can be fully operated using tap water instead of fog oil to cool the engine. However, there are still maintenance concerns over the use of water as a coolant, and the use of water may result in safety problems (associated with ice formation) during freezing weather.

U.S. Air Force static training would continue to use the A/E 32U-13 generator. Although this generator is similar to the Army M56 system, a recycling adapter has not yet been developed for this system. Consequently static training on the A/E 32U-13 generator system will require the use of up to an additional 500 gallons of fog oil per year (approximately).

Therefore, total fog oil usage under the EPTM Alternative for static fog oil obscurant training would be limited to up to **1,000 gallons** per year.

#### 3.3.3.7.3 Obscurant, Employment Proficiency Test (Mobile Operations) (Training Goal 7.3)

- **Objective.** To expand on the level of understanding that personnel have following completion of training goals 7.1 and 7.2, as discussed above. Personnel completing this training should be able to anticipate the effects of existing environmental conditions (temperature, wind direction, wind speed, air stability, etc.) to develop the most effective plan for generating and employing obscurants.

- **Training Activity.** This training activity includes training in mobile smoke operations and the use of mobile smoke to obscure specific targets. Included in this training objective is the interpretation of meteorological conditions, determination of the best time and equipment positioning points to generate obscurants to cover the desired target, and a review of available systems to allow selection of the proper obscurant and dispersion methods. Other forms of obscurants (including smoke grenades and smoke pots) are used in this training goal as needed to fill holes in the obscurant cloud. Information concerning the number and type of smoke grenades and smoke pots used in obscurant training is located in Volume III, Appendix B.

- **RCP Alternative.** Following the training discussed under training goals 7.1 and 7.2, this training includes:

  - additional instruction at the field training area on the goals and
  - use of obscurants during maneuver operations on the battlefield.

  This training is followed by refresher training on meteorological information and control parameters. Students are then tasked with obscuring a designated target, and required to develop and implement an execution plan. Equipment familiarization, operator training and a field/maneuver demonstration of capability follows the refresher training as students attempt to use obscurant equipment to conceal the designated target using fog oil based obscurant.

  The differences between the alternative methods available for meeting this TG involve:

  - changing the quantity of fog oil used, and
  - use of computer model to simulate fog oil behavior and augment field training.

  Implementation of the RCP Alternative under this training goal (mobile operations) will require the use of up to **41,500 gallons** of fog oil per year.

- **OPTM (Army's Proposed Action) and EPTM Alternative.** This alternative includes the items discussed in the RCP Alternative above, but would reduce the amount of fog oil consumed through reduced field training time, offset by the use of computer model simulation to augment the actual mobile field training activities, and a reduction in the amount of fog oil emitted during training. This alternative reduces the quantity of fog oil used for mobile training to up to **20,000 gallons** per year.

#### 3.3.3.7.4 Obscurant, Employment Proficiency Test (Field Training Exercises) (Training Goal 7.4)

- **Objective.** To expand on the level of understanding that personnel have following completion of training goals 7.1, 7.2 and 7.3, and training to include a more realistic military operational environment.

- **Training Activity.** This training activity includes training in the employment of static and mobile smoke to support concealment operations during more advanced field training exercises. Included in this training objective is the integration of meteorological conditions, determination of the best time and equipment positioning points to generate obscurants to cover the desired target, and a review of available systems to allow the selection of the proper obscurant and dispersion methods. Other forms of obscurants (including smoke grenades and smoke pots) are used in this training goal as needed to fill holes in the obscurant cloud. Information concerning the number and type of smoke grenades and smoke pots used in obscurant training is located in Volume III, Appendix B.

- **RCP Alternative.** This training alternative includes:

  - classroom instruction to provide additional instruction on the goals associated with use of obscurant on the battlefield, and
  - field maneuver training exercises that last approximately three days and two nights.

  During the field training exercises, students must demonstrate the ability to generate obscurant or "smoke" cover at a specific location for a specified period of time. Working with meteorological data and forecasts, the students must develop and implement an operational plan to support the battlefield commander.

The difference between this and the other training alternatives involves the amount of fog oil that is used to complete the training. Under the RCP Alternative, implementation of this training goal (field training) will require the use of up to **64,000 gallons** per year.

**Total Fog Oil Usage Associated with RCP Alternative (All Training Goals).** As described under training goals 7.2, 7.3 and 7.4, above, implementation of the RCP Alternative would result in total annual fog oil usage of up to **125,500 gallons** (20,000 for static, 41,500 for mobile and 64,000 for field training). This annual use level exceeds the annual amount currently allowed by the permit issued by the State of Missouri (65,000 gallons). In addition, implementation of the RCP Alternative (all fog oil training goals) would periodically require the use of up to 1,900 gallons of fog oil during a single training day, versus the daily limit included in the current permit of approximately 3,700 pounds (481 gallons as discussed in subsection 5.2.2.3.7) of fog oil. In practice, the total amount of fog oil that will be used on a daily and annual basis will be determined by the number of classes in session and overall training requirements. Consequently the amount of fog oil used for training goals 7.2, 7.3 and 7.4 may vary. *However (as discussed in subsection 3.3.3.7 above), under any circumstance, FLW will adhere to all permit conditions in effect at the time training occurs.*

- **OPTM (Army's Proposed Action) Alternative.** Under the OPTM (Army's Proposed Action) Alternative, the total amount of fog oil used for this training goal (field training exercises) would be reduced to up to 56,000 gallons per year. This reduction is accomplished by reducing the time that training is conducted, reducing generator emissions through the use of flow controls provided on the new M56 generators. This is a notable reduction in fog oil use as compared to the RCP alternative. Training in a realistic military operational environment is critical to ensuring a thorough understanding of the effects of meteorological conditions and to train the selection of the proper obscurant and dispersion methods.

  **Total Fog Oil Usage Associated with OPTM (Army's Proposed Action) Alternative (All Training Goals).** As described under training goals 7.2, 7.3 and 7.4, above, implementation of the OPTM (Army's Proposed Action) Alternative would result in total annual fog oil usage of up to **84,500 gallons** (8,500 for static, 20,000 for mobile and 56,000 for field training). This annual use level exceeds the annual amount currently allowed by the permit issued by the State of Missouri (65,000 gallons). In addition, implementation of the OPTM (Army's Proposed Action) Alternative (all fog oil training goals) would periodically require the use of up to 1,200 gallons of fog oil during a single training day, versus the daily limit included in the current permit of approximately 481 gallons. In practice, the total amount of fog oil that will be used on a daily and annual basis will be determined by the number of classes in session and overall training requirements. Consequently the amount of fog oil used for training goals 7.2, 7.3 and 7.4 may vary. *However (as discussed in subsection 3.3.3.7 above), under any circumstance, FLW will adhere to all permit conditions in effect at the time training occurs.*

- **EPTM Alternative.** Under the EPTM Alternative, the total amount of fog oil used for this training goal (field training exercises) would be reduced to up to 28,500 gallons per year. This annual volume is achieved through further reductions in the time that training is conducted, reducing generator emissions through the use of flow controls provided on the new M56 generators, and the development and use of computer simulation to offset reduced field training time. A computer system will need to be developed to allow implementation of this alternative, because existing simulation systems are not capable of adequately replicating obscurant employment principles in a field environment.

  **Total Fog Oil Usage Associated with EPTM Alternative (All Training Goals).** As described under training goals 7.2, 7.3 and 7.4, above, implementation of the EPTM Alternative would result in total annual fog oil usage of up to **49,500 gallons** (1,000 for static, 20,000 for mobile and 28,500 for field training). This annual use level is considerably

less than the annual amount currently allowed by the permit issued by the State of Missouri (65,000 gallons). In addition, implementation of the EPTM Alternative (all fog oil training goals) would periodically require the use of up to 1,200 gallons of fog oil during a single training day, versus the daily limit included in the current permit of approximately 481 gallons. In practice, the total amount of fog oil that will be used on a daily and annual basis will be determined by the number of classes in session and overall training requirements. Consequently the amount of fog oil used for training goals 7.2, 7.3 and 7.4 may vary. *However (as discussed in subsection 3.3.3.7 above), under any circumstance, FLW will adhere to all permit conditions in effect at the time training occurs.*

#### 3.3.3.7.5 Obscurant, Generator Maintenance (Training Goal 7.5)

- **Objective.** To ensure that personnel understand and are able to maintain generator systems that are in use by the Department of Defense.

- **Training Activity.** This training activity includes training in the maintenance of the generators and generator systems.

- **RCP Alternative.** The alternative includes the use of:

  - classroom instruction, followed by
  - the use of typical pieces of equipment to demonstrate operator level maintenance procedures in an area that lacks stormwater control, and
  - actual hands-on equipment maintenance by students to demonstrate proficiency.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This alternative varies from the RCP Alternative in that the use of vehicles and generators for training in exterior training areas will be limited to areas that have controlled stormwater collection to prevent the inadvertent runoff of stormwater which might contain inadvertently spilled POL and hydraulic fluids.

#### 3.3.3.7.6 Obscurant, Storage Operations (Training Goal 7.6)

- **Objective.** To ensure that personnel understand the operational and environmental concerns associated with storing obscurant source materials.

- **Training Activity.** This training activity includes training on the proper methods to be employed when storing, loading, unloading and transferring material used in obscurant training and operations.

- **RCP Alternative.** Each of the training alternatives for this TG will include:

  - classroom instruction
  - followed by hands-on training.

  The differences between the training methods for this TG involve the type of training facility used for the hands-on training. Under the RCP Alternative hands-on training will be conducted in decentralized uncovered oil storage areas.

- **OPTM (Army's Proposed Action) Alternative.** Under this alternative the hands-on training will be conducted in decentralized covered oil storage areas.

- **EPTM Alternative.** Under this alternative the hands-on training will be conducted in a centralized covered oil storage area.

## 3.3.3.8 Radiation Safety (Training Activity Group No. 8)

### 3.3.3.8.1 Radiation Safety (Training Goal 8.1)

- **Objective.** To ensure that personnel understand and are able to apply the principles and practices of radiation protection; radiological monitoring techniques (sufficient to measure radioactivity and evaluate real or potential hazards); radiological instrumentation (including operation, calibration, and limitations); biological and health effects of radiation; exposure guidance; handling, transportation, storage, disposal and decontamination procedures; and applicable Federal and Army regulations.

- **Training Activity.** This training activity includes radiation detection and identification; laboratory operations; radiation equipment operations; and radiation equipment maintenance. Students will obtain knowledge concerning the mathematics and calculations involving the shielding of radiation; decay and the half-life concept; learn decontamination procedures *using radioactive nuclides* in a controlled laboratory environment; and review principles concerning ionizing and non-ionizing radiation to include storage, handling, transportation, disposal, reporting, and control; and general precautions for depleted uranium, tritium, x-rays, microwaves, and lasers.

- **RCP Alternative.** Under this alternative, training would include the:

  - use of a general instruction classroom;
  - the use of equipment and radiological training aids in a specifically designed radiation lab which meets all regulations and is licensed by the NRC;
  - the infrequent use of small sealed radiological materials in outdoor training; and
  - the ability to use small unsealed radiological materials in outdoor training if required.

  The radiation laboratory will use small quantities of many isotope sources. Most of these are equipment calibration sources or low activity laboratory sources. The most common isotopes used in training are listed in Volume III, Appendix B and Volume IV of the EIS.

  The majority of the radiation training takes place in the laboratories.

  Outdoor training simulating high radiation fields (which are typical of radiological fallout) is accomplished through the use of the AN/TDQ-T1(V) which uses radio waves to simulate a radiation field. However, the AN/TDQ-T1(V) simulator is ineffective in simulating the radiological effects of unsealed and sealed radiological sources. Consequently, Radiation Safety training includes the infrequent use of unsealed and sealed radiological sources in exterior training environments.

  The use of the AN/TDQ-T1(V) simulator coupled with use of sealed radiological sources is capable of meeting all current and anticipated future training requirements. However these types of training are not able to replicate the full spectrum of potential training requirements. Consequently, the Chemical School obtained approval (in its existing NRC license at FMC) to construct and operate an alpha field training area where they could conduct training with small quantities of unsealed radiological materials. Even though the school is licensed to operate an outdoor alpha field where unsealed radiological materials could be used in training, and one was built at FMC, the field has never been used for training and there are no plans to use the alpha field in the future. Relocation of the current training practice would include duplication of the never used alpha field at FLW.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This alternative is identical to the RCP Alternative except that it limits training with unsealed radiological isotopes to a

classroom/laboratory environment. The training method will remove the ability to perform exterior training with unsealed radiological isotope sources which is currently allowed in the NRC license at FMC. As discussed above, the ability to use unsealed radiological isotope sources in an exterior training environment has never been performed at the FMC alpha field, and there are no plans to implement this type of training at either FMC or FLW. The difference between the RCP Alternative and the OPTM (Army's Proposed Action) and EPTM Alternative is a restriction of training to a greater extent than is currently called for in the existing NRC license at FMC, consequently:

- there are no plans to implement exterior training with unsealed radiological materials;
- the construction of an alpha field has not been requested as part of the BRAC process; and
- the environmental impacts associated with the selection of a training site, construction of the training area, or implementation of this type of training have not been addressed in this EIS.

Should the need arise in the future to implement exterior training with unsealed radiological materials, proper environmental documentation in accordance with NRC License, NEPA and AR 200-2 will be completed by the Army.

#### 3.3.3.8.2 Radiation, Test and Operational Equipment Storage (Training Goal 8.2)

- **Objective.** To ensure that personnel understand the unique storage and maintenance requirements of equipment that contains radioactive isotopes.

- **Training Activity.** This training activity involves instruction in general precautions for the handling and storage of test and operational equipment containing depleted uranium or tritium, or emitting x-rays, microwaves or lasers.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative includes the requirement to store:

  - radiation test equipment,
  - operational equipment that uses radiological sources, and
  - low level radiological waste generated in the training process.

  Storage facilities will be constructed to meet NRC requirements. Under this alternative most radiation test and operational equipment storage, and the low level waste storage area would be located in a centralized storage facility. However, equipment used on a regular basis in other areas would be stored closer to those areas, decreasing the amount of time required for instructors to prepare for training.

## 3.3.3.9 Research Support (Training Activity Group No. 9)

#### 3.3.3.9.1 Research Support (Training Goal 9.1)

- **Objective.** To provide access to general and specialized library resources in order to support research carried out as a component of training.

- **Training Activity.** This training activity includes access to general library information, general historical information and historical information concerning Army; and Chemical, Engineer, or Military Police Corps traditions.

- **RCP Alternative.** Under this alternative two new libraries will be established in the cantonment area of the installation to store and display the library collections of the Military Police School and Chemical School.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** Under this alternative the library collections of the Military Police School and Chemical School would be housed in Clarke Hall. The U.S. Army Engineer Center and FLW Community libraries are also located in Clarke Hall. Interior renovation or the construction of an addition to Clarke Hall would be included in the alternative, if required, to provide adequate space for these additional requirements.

#### 3.3.3.9.2 Library, Specialized/Classified Information and Museum Artifacts (Training Goal 9.2)

- **Objective.** To provide access to historical and specialized library resources in order to support research carried out as a component of training. Management of classified information and museum artifacts are included in this activity.

- **Training Activity.** This training activity includes advanced instruction on obtaining and using historical and specialized information.

- **RCP Alternative.** Under this alternative a dedicated storage location within the Chemical School Library will be provided for specialized and classified information, and two additional museums will be established to store and display the collections of the Military Police Museum and Chemical Museum.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** Under this alternative:

  - Museum artifacts would be stored and displayed at the existing Engineer Center Museum (which will be renamed to reflect the expanded mission);
  - specialized and classified information would be stored at Hoge Hall, and
  - Museum artifact display cases would be dispersed throughout other educational facilities.

  Additions to these buildings would be constructed to provide adequate area for the additional items, if required.

## 3.3.3.10 Small Arms Procedures (Training Activity Group No. 10)

#### 3.3.3.10.1 Weapons Training (Training Goal 10.1)

- **Objective.** To ensure that personnel understand the operation of the weapons fired for familiarization and qualification, and how to most effectively employ the weapons. This training includes instruction on both individual and crew-served weapons. Crew-served weapons are defined as those weapons that require more than one person to operate.

- **Training Activity.** This training activity includes instruction in weapons qualification and familiarization, and Sniper and Special Weapons proficiency. Weapons that personnel will be trained on are listed in Volume IV of the EIS. Weapons qualification and familiarization includes training on the following weapons:

  - rifles (.308 caliber);
  - AR15 (5.56 mm) assault rifle;
  - AT4 anti-tank weapon;
  - Mark 19 (40 mm) grenade machine gun;
  - M2 (0.50 caliber) machine gun;

- (Colt) M4 sub-machine gun;
- M16 (5.56 mm) rifle (which is capable of firing semi-automatic or three-round bursts through the use of a selector switch) including the use of "match grade" ammunition for the M16A2 rifle;
- M24 Sniper Rifle and the Remington 700 Sniper Rifle;
- M60 (7.62 mm) machine guns;
- M203 (40 mm) grenade launcher;
- M240 (7.62 mm) machine guns;
- M249 (5.56 mm linked) squad assault weapon (SAW);
- M250 (40 mm) grenade launcher;
- M1200 (12 gauge) shotgun which will be replaced in the near future by the Benelli M1 shotgun and the Remington 870 shotgun;
- MP5K (9 mm) submachine gun;
- FOX vehicle machine gun;
- Uzi machine gun; and
- Crew-Served Weapons (which include those weapons that require more than one person to operate).

- **RCP and OPTM (Army's Proposed Action) Alternatives.** This training alternative will be accomplished through the use of:

  - classrooms,
  - the use of FATS and
  - live-fire of weapons on weapons familiarization and qualification ranges.

  Individual and crew-served weapons that are included in this training objective are listed in Volume IV of the EIS. Implementation of this alternative training method will differ from the EPTM Alternative in the type of munitions used to complete Mark 19 training. For training under this alternative:

  - Each Army student will use 6 high-explosive and 30 modified training rounds, and
  - Each Marine Corps student will use 24 high-explosive rounds.

- **EPTM Alternative.** This alternative will be identical to the RCP and OPTM (Army's Proposed Action) Alternative except that all Mark 19 training will use modified training rounds. These rounds are specifically designed to reduce the potential and extent of ricochet that will be experienced. For training under this option:

  - Each Army student will use 30 modified training rounds, and
  - Each Marine Corps student will use 24 modified training rounds.

### 3.3.3.10.2 Weapons Training, Pistol (Training Goal 10.2)

- **Objective.** To ensure that personnel understand the operation of the pistols fired for familiarization and qualification, and how to most effectively employ the weapons.

- **Training Activity.** This training activity includes instruction in the handling, firing and maintenance of the following weapons: .45 caliber and 9 mm pistols (including 9 mm combat pistol training specific to the Marine Corps), and weapons employment (shoot/no shoot).

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** Under this training alternative students will be instructed in the use of various pistol weapons. This training will be accomplished through the use of:

- classrooms, simulators, and
- live-fire of weapons on weapons familiarization and qualification ranges.

The FATS allow students to gain and demonstrate skills during controlled day-time or night-time scenarios that stress weapons employment in a shoot/no shoot environment, and stress the importance of accuracy once a shoot decision is made.

#### 3.3.3.10.3 Weapons Storage (Training Goal 10.3)

- **Objective.** To ensure that personnel understand the principles and procedures of NBC weapons storage (to allow graduates to inspect storage sites as required for treaty monitoring and verification), small arms storage and the transportation of weapons and ammunition, in order that these functions may be carried out safely and efficiently.

- **Training Activity.** This training activity includes instruction on NBC weapons and small arms storage; transportation of weapons and ammunition; and treaty monitoring.

- **RCP, OPTM (Army's Proposed Action) and EPTM Alternatives.** This alternative includes the use of a general instruction classroom followed by the use of mock facilities allowing students to gain and demonstrate skills in a controlled environment.

## 3.3.3.11 Vehicle Operations (Training Activity Group No. 11)

#### 3.3.3.11.1 Vehicle Operations, Driver Qualification (Training Goal 11.1)

- **Objective.** To provide drivers with a basic introduction to the operation of vehicles, including unique military vehicles. This training objective includes the operation of these vehicles in both tactical and non-tactical maneuvers.

- **Training Activity.** This training activity includes instruction on: convoy procedures; tracked vehicle operations; wheeled vehicle operations; HMMWV operations; Armored Security Vehicle (ASV) operations; and Light Vehicle Obscuration Smoke System (LVOSS) operations. The LVOSS is mounted on HMMWVs used by military police during battlefield operations. This training includes instruction on proper procedures to be used during both tactical and non-tactical operations.

- **RCP Alternative.** The alternative includes the use of general instruction classrooms to introduce students to military vehicle operations including the HMMWV, 2.5- and 5-ton trucks, coupe vehicles (pickup trucks), sedans, forklifts, and semi-tractor trailers. This training is followed with driving practice in both tactical and non-tactical environments including:

  - on established training areas;
  - on rock and asphaltic concrete paved driving areas in training areas; and
  - on the installation roadway system.

  Depending upon the type of vehicle and level of training being obtained, specifically designed obstacles would be employed that allow students to experience and utilize the tactical capabilities of the vehicles. These obstacles include water pits, mud pits, sand pits, logs across the roadway, boulders and rocks in the roadway, and specifically designed turning and backing areas. Driving courses are designed to test the skills of the operator and to demonstrate some of the capabilities of the vehicles.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative is identical to the RCP Alternative except that it may use driving simulators, when developed, to augment existing driving training.

### 3.3.3.11.2 Evasive Driving (Training Goal 11.2)

- **Objective.** To provide drivers and protective service personnel with functional training in threat recognition and avoidance and in vehicle handling necessary to perform evasive maneuvers.

- **Training Activity.** This training activity includes instruction in advanced driving techniques including evasive maneuvers, using vehicles to form protective screens and escape procedures.

- **RCP and OPTM (Army's Proposed Action) Alternatives.** This alternative includes the use of a general instruction classroom followed by:

  - use of a paved, controlled driver training area to provide driving practice without endangering other vehicle's occupants on the installation's roadway system, and
  - use of a paved area designed and constructed to facilitate training on skids and slides.

  At FMC the training area includes a two-lane roadway which is approximately 1.2 miles long and a 75-foot by 75-foot driving skid pad.

- **EPTM Alternative.** This training alternative varies from the RCP and OPTM (Army's Proposed Action) Alternative in that it does not include classroom instruction thereby eliminating the impacts associated with the construction of additional classroom space.

### 3.3.3.11.3 Vehicle Maintenance Training (Training Goal 11.3)

- **Objective.** To ensure that personnel understand the proper maintenance procedures to use on the vehicles.

- **Training Activity.** This training activity includes maintenance instruction on tracked vehicles, wheeled/non-tactical vehicles and wheeled/tactical vehicles.

- **RCP Alternative.** This training alternative includes:

  - classroom instruction to introduce students to a piece of equipment;
  - use of a limited number of internal components in the classroom to demonstrate general operator maintenance procedures such as how to perform required pre-start and operator level maintenance (such as checking the oil and other fluids);
  - instruction and demonstration of how to perform required pre-start and operator level maintenance (such as checking the oil and other fluids); and
  - hands-on demonstration on how to perform required pre-start and operator level maintenance in an exterior area near the classroom.

  This training involves actual hands-on training with equipment providing students the opportunity to see the equipment, locate required gauges and fluid check points, and to perform maintenance as required such as adding oil, hydraulic fluid, or air. This training would be associated with the approximately 910 vehicles and pieces of equipment that will be relocated from FMC to FLW, of which approximately 457 of these vehicles will be assigned to the Military Police School, Chemical School, and the training brigade. A complete listing of vehicles is provided in Volume III, Appendix B.

- **OPTM (Army's Proposed Action) and EPTM Alternatives.** This training alternative varies from the RCP Alternative by requiring that outdoor, hands-on demonstrations of operator maintenance be conducted in an area designed to control surface water runoff.

**This completes the discussion of training alternatives which represent the first element of the planned BRAC action. Section 3.4 below provides a discussion of the second major element of the action, provision of facilities required to support the planned relocation of the Military Police School and Chemical School to FLW.**

# 3.4 SUPPORTING FACILITY ALTERNATIVES

As discussed in subsection 3.2.2, the second element of the alternative formulation for planned activities to occur at FLW involves consideration of the type, extent and location of support facilities that will be required to accommodate the training missions and related equipment and personnel to be relocated. Subsection 3.4.1 describes the NA Alternative that was considered for this element; and subsections 3.4.2.1 through 3.4.2.3 describe three "Land Use and Facility Plan" alternatives to be evaluated in detail in Section 5 of this EIS.

### 3.4.1 No Action Alternative

The No Action Alternative (as applied to this element of the planned action) would result in the continuation of current, ongoing management, operations and training activities at FLW. This includes continuation of all ongoing mission (pre-BRAC) activities, and continued implementation of the *Master Plan for the U.S. Army Engineer Center and Fort Leonard Wood* (FLW, 1991c) and all associated plan elements.

As part of the Master Plan, FLW has an approved land use plan which is used to guide all future development activities similar to a city zoning ordinance. The existing FLW land use plan (and all other elements of the installation ongoing mission and Master Plan) have been analyzed in prior NEPA documents including the *Final Environmental Assessment of the Master Plan and Ongoing Mission* (FLW, 1995c) and the *Final Environmental Assessment of the Training Area Master Plan for the U.S. Army Engineer Center and Fort Leonard Wood* (FLW, 1994e). The FLW existing (pre-BRAC) land use plan is discussed in Section 4, subsection 4.2.3, and illustrated in Figure 4.1 (for the total installation), and Figure 4.2 (for the FLW cantonment area). The existing land use plan provides an environmental baseline that can be used to identify land use changes (and related impacts) that would need to occur under each of the BRAC-related land use and facility plan implementation alternatives defined in this EIS.

Under the No Action Alternative for this study element, FLW would be required to accommodate or absorb the mandated relocation of the Military Police School and the Chemical School, and associated units, without the benefit of any changes in the installation land use plan, facility alterations or new construction projects. Volume III, Appendix C (*Identification and Screening of Support Facility Alternatives*) provides a detailed discussion of the ability to use existing facilities at FLW to meet relocating activity requirements. This analysis considered the potential to change existing management practices and facility assignment guidelines, the consolidation of similar or compatible uses in existing structures by increasing the use density, and the potential to reuse existing facilities as they currently exist, or through building modifications (adaptive reuse). The analysis in Volume III, Appendix C also considered the potential to lease facilities within the surrounding communities to help meet facility requirements.

Based on the analyses documented in Volume III, Appendix C, it was determined that existing facilities at FLW can only support about half of the identified relocation requirements, and that opportunities to lease space off-post are very limited. Therefore, given the fact that the relocation action must be implemented (based on BRAC legislation), it was determined that the NA Alternative is not viable. Accordingly, this alternative will not be further evaluated in Section 5.

### 3.4.2 Presentation of BRAC Land Use and Facility Plan Alternatives

An extensive analysis was conducted by the Army and the EIS study team to define the support facility requirements of the Military Police School, the Chemical School and other BRAC-related support units. This analysis began with the preparation of DD Form 1391 Programming Documents (FLW, 1995d). These documents were prepared based on standard Army facility planning and budgeting procedures. In addition to defining the need for and intent of each construction project, the programming documents include provisions to minimize environmental damage associated with construction activities. These provisions included features such as: implementation of standard project erosion control measures; construction of sediment ponds to collect stormwater runoff, and minimize sediment flow into area streams and rivers; removal, stockpiling and redistribution of top soil resources following construction; landscaping and provisions to reestablish native and ornamental vegetation on areas disturbed by construction; and provisions for control of stormwater runoff from new construction sites.

The programming document analysis provided an inventory and comparison of existing BRAC-related facilities at Fort McClellan with all current and programmed facilities at FLW. This analysis was conducted at the detailed facility "category code" level, and considered the functional requirements of all activities. This process resulted in the identification of total facility requirements in excess of 1.6 million square feet of space and numerous range and training area requirements. Detailed analysis of facilities at FLW resulted in the identification of approximately 800,000 square feet of existing facility space that could be used to help meet these relocation requirements. This left a shortfall of an additional 800,000 square feet of facility space that must be met through new construction.

The EIS study team worked with the Army to use information provided in the DD Form 1391 Programming Documents and other source material to develop BRAC land use and facility siting alternatives for analysis in this EIS. The alternative formulation process for this element of the action is documented in Volume III, Appendix C, *Identification and Screening of Support Facility Alternatives.* Appendix C describes the process that was used to select alternative construction sites. *A key element of this process included the location of facilities in existing, approved land use zones to the extent possible in order to maximize consistency with established plans; and use of extensive information on the installation's natural, cultural and man-made resources to locate sites so as to minimize adverse impacts.* This process resulted in the identification of three distinct BRAC land use and facility plans to be evaluated in detail in this EIS.

It should be noted that each of alternative BRAC development plans will require some relatively minor changes to the existing installation land use plan to accommodate new facilities that need to be located in the cantonment area of the installation. No changes in the existing approved land use plan in the non-cantonment area of the installation will be required under any of the facility implementation alternatives. The three development plans identified for analysis include:

1. **Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction)**;

2. **Alternative 1 Land Use and Facility Plan (Combined Headquarters)**; and

3. **Alternative 2 Land Use and Facility Plan (Separate Headquarters)**.

The BRAC land use plans for each of these alternatives are based on variations in the location of the:

- Military Police School and Chemical School headquarters relative to the existing FLW headquarters for the Engineer School;
- CDTF;
- Ranges and Training Areas (including fog oil smoke training areas);
- Officer (primarily general instruction) classrooms and unaccompanied personnel housing;
- Non-Commissioned Officer Academy (general and applied instruction) classrooms and unaccompanied personnel housing;

- One Station Unit Training (applied and general instruction classrooms, enlisted barracks, and applied instruction training) areas;
- school libraries; and
- school museums.

Table 3.3 has been included to provide an overview of the total BRAC facility program under each of the Land Use and Facility Plan Alternatives to be analyzed. This table summarizes an extensive amount of information including:

- The relationship of each of the training goals presented in subsection 3.3 to specific facilities that are required to implement the goals;

- The assignment of each support facility to one of eight "BRAC Construction Packages" as noted in the table, summarized in subsections 2.4.2.1 through 2.4.2.8, and described in detail in Volume III, Appendix C;

- BRAC facility site locator numbers that relate each support project to Figures 3.2 through 3.7 (which follow Table 3.3) that have been included to illustrate the general location of all projects under each development alternative.

Subsections 3.4.2.1 through 3.4.2.3 (following Table 3.3) provide descriptions of three comprehensive BRAC Land Use and Facility Plan (LU & FP) Alternatives to be evaluated in this EIS. These descriptions reference generalized maps (figures) that have been included to identify the changes that would occur to the existing (pre-BRAC) FLW land use plan as a result of each alternative, and maps that illustrate the general location of all BRAC projects associated with each alternative. Due to the large number of projects to be considered, and their distribution throughout the installation, these maps have been presented at a schematic level of detail. However, the EIS study team used detailed mapping, aerial photographs, and site investigations to evaluate the impacts of each BRAC facility project. Specific analytical procedures that were used are described in applicable portions of Section 5, *Environmental Consequences.*

It should be noted that each land use classification represents the primary or dominant land use activity to occur in each zone. However, FLW land use classifications (which are compatible with military regulations) allow for the location of other compatible uses within these zones. For example, certain classroom training activities may occur within areas designated as "Administration", "Community Facilities" and "Training" land use zones. This is not unlike a community zoning plan that allows compatible activities to occur within designated land use zones (i.e., allowing for the construction of a day care center or school within an area zoned for residential use).

Footnotes used on Table 3.3 are defined at the end of the table.

**Table 3.3: Relationship of Training Goals and Support Facilities to Site Locations by BRAC Land Use and Facility Alternative**

| Training Activity Group (TAG), Training Goals (TG) and Supporting Facilities | BRAC Construction Packages [1] | BRAC Land Use and Facility Alternatives | | |
|---|---|---|---|---|
| | (Same for each alternative Land Use and Facility Plan (LU & FP) | Army's Proposed LU & FP (Combined Headquarters & Instruction) | Alternative 1 LU & FP (Combined Headquarters) | Alternative 2 LU & FP (Separate Headquarters) |
| | | Site Location [2] | Site Location [2] | Site Location [2] |
| TAG 1. BATTLEFIELD PROCEDURES | | | | |
| TG 1.1 Call-for-Fire Support | | | | |
| classroom, general instruction (officer) | GIF | P-1 | 1-1 | 2-1/1A |
| classroom, general instruction (non-commissioned officer (NCO)) | GIF | P-2 | 1-2 | 2-2 |
| 35 mm projection area | GIF | P-1 | 1-1 | 2-1/1A |
| TG 1.2 Maneuver Operations | | | | |
| classroom, general instruction (officer) | GIF | P-1 | 1-1 | 2-1/1A |
| classroom, general instruction (NCO) | GIF | P-2 | 1-2 | 2-2 |
| classroom, general instruction Chemical One Station Unit Training (OSUT)) | AIF | P-3 | 1-3 | 2-3 |
| classroom, general instruction (Military Police (MP) OSUT) | AIF | P-4 | 1-4 | 2-4 |
| simulators | GIF | P-1 | 1-1 | 2-1/1A |
| field/maneuver [3] | Range | use existing [4] | use existing [4] | use existing [4] |
| TG 1.3 Mines and Obstacles [5] | | | | |
| Flame Field Expedient Range | Range | P-5 | 1-5 | 2-5 |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| TG 1.4 NBC Warning and Reporting [5] | | | | |
| simulators | GIF | P-1 | 1-1 | 2-1/1A |
| field/maneuver | Range | P-6 | 1-6 | 2-6 |
| TG 1.5 Night-Time Squad Engagement [5] | | | | |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| simulators | AIF | P-4 | 1-4 | 2-4 |
| TG 1.6 Unarmed Self-Defense [5] | | | | |
| demonstration (MP self-defense) | AIF | P-4 | 1-4 | 2-4 |
| field/maneuver (hand-to-hand) | Range | use existing [4] | use existing [4] | use existing [4] |
| TG 1.7 Urban Terrain [5] | | | | |
| range/field/maneuver [6] | MOUT | P-7 | 1-7 | 2-7 |
| TG 1.8 Warfighting and Tactical Oper. [5] | | | | |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| simulators | GIF | P-1 | 1-1 | 2-1/1A |
| TAG 2. BIOLOGICAL AGENT DETECTION | | | | |

| Table 3.3: Relationship of Training Goals and Support Facilities to Site Locations by BRAC Land Use and Facility Alternative | | | | |
|---|---|---|---|---|
| **Training Activity Group (TAG), Training Goals (TG) and Supporting Facilities** | **BRAC Construction Packages [1]** | **BRAC Land Use and Facility Alternatives** | | |
| | **(Same for each alternative Land Use and Facility Plan (LU & FP)** | **Army's Proposed LU & FP (Combined Headquarters & Instruction)** | **Alternative 1 LU & FP (Combined Headquarters)** | **Alternative 2 LU & FP (Separate Headquarters)** |
| | | **Site Location [2]** | **Site Location [2]** | **Site Location [2]** |
| TG 2.1 BIDS Employment & Operations | | | | |
| classroom (officer) | GIF | P-1 | 1-1 | 2-1A |
| classroom (NCO) | GIF | P-2 | 1-2 | 2-2 |
| classroom (Chemical OSUT) | AIF | P-3 | 1-3 | 2-3 |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| simulators | GIF | P-1 | 1-1 | 2-1A |
| TG 2.2 BIDS Maintenance | | | | |
| classroom (BIDS course students) | GIF | P-1 | 1-1 | 2-1A |
| hands-on demonstration | AIF | P-8 | 1-8 | 2-8 |
| TG 2.3 LR-BSDS Battlefield employment | | | | |
| classroom (BIDS Course Students) | GIF | P-1 | 1-1 | 2-1A |
| exterior demonstration | GIF | P-1 | 1-1 | 2-1A |
| TG 2.4 LR-BSDS Maintenance | | | | |
| classroom (BIDS Course Students) | GIF | P-1 | 1-1 | 2-1A |
| exterior demonstration | GIF | P-1 | 1-1 | 2-1A |
| TAG 3. NBC RECONNAISSANCE | | | | |
| TG 3.1 FOX Battlefield Employment & Operations | | | | |
| classroom (officer) | GIF | P-1 | 1-1 | 2-1A |
| classroom (NCO) | GIF | P-2 | 1-2 | 2-2 |
| classroom (Chemical OSUT) | AIF | P-3 | 1-3 | 2-3 |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| field/maneuver (amphibious) | Range | P-9 | 1-9 | 2-9 |
| simulators | GIF | P-1 | 1-1 | 2-1A |
| TG 3.2 FOX Maintenance | | | | |
| classroom (FOX Course Students) | GIF | P-1 | 1-1 | 2-1A |
| hands-on demonstration | AIF | P-8 | 1-8 | 2-8 |
| TAG 4. GENERAL MILITARY TRAINING (GMT) | | | | |
| TG 4.1 GMT [5] | | | | |
| TG 4.2 GMT, Field Training [5] | | | | |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| TG 4.3 GMT, NBC Personal Protective Equipment [5,7] | | | | |
| field/maneuver | Range | P-6 | 1-6 | 2-6 |

**Table 3.3: Relationship of Training Goals and Support Facilities to Site Locations by BRAC Land Use and Facility Alternative**

| Training Activity Group (TAG), Training Goals (TG) and Supporting Facilities | BRAC Construction Packages [1] | BRAC Land Use and Facility Alternatives | | |
|---|---|---|---|---|
| | (Same for each alternative Land Use and Facility Plan (LU & FP) | Army's Proposed LU & FP (Combined Headquarters & Instruction) | Alternative 1 LU & FP (Combined Headquarters) | Alternative 2 LU & FP (Separate Headquarters) |
| | | Site Location [2] | Site Location [2] | Site Location [2] |
| TG 4.4 Signals & Other Non-verbal Communications [5,7] | | | | |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| TG 4.5 Radio Communications [5,7] | | | | |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| laboratory (communications) [7] | GIF | P-1 | 1-1 | 2-1/1A |
| TG 4.6 Computer Operations [5] | | | | |
| laboratory (computer, officer) | GIF | P-1 | 1-1 | 2-1/1A |
| laboratory (computer, NCO) | GIF | P-2 | 1-2 | 2-2 |
| laboratory (computer, MP OSUT) | AIF | P-4 | 1-4 | 2-4 |
| TG 4.7 Physical Fitness and Total Fitness [5] | | | | |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| TAG 5. MILITARY POLICE OPERATIONS | | | | |
| TG 5.1 Basic MP Functions [5] | | | | |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| mock facilities (officer) | GIF | P-1 | 1-1 | 2-1 |
| mock facilities (NCO/OSUT) | AIF | P-4 | 1-4 | 2-4 |
| TG 5.2 Advanced Law Enforcement [5] | | | | |
| field/maneuver | Range | use existing [4] | use existing [4] | use existing [4] |
| mock facilities (officer) | GIF | P-1 | 1-1 | 2-1 |
| mock facilities (NCO/OSUT) | AIF | P-4 | 1-4 | 2-4 |
| TAG 6. NBC PROCEDURES | | | | |
| TG 6.1 NBC Procedures [5] | | | | |
| exterior training [8] | Range | use existing [4] | use existing [4] | use existing [4] |
| laboratory (radiation) | GIF | P-1 | 1-1 | 2-1A |
| TG 6.2 NBC Equipment [5] | | | | |
| exterior training | Range | use existing [4] | use existing [4] | use existing [4] |
| exterior training | AIF | P-3 | 1-3 | 2-3 |
| TG 6.3 NBC Deacon Advanced (Toxic Agent) | | | | |
| classroom, general instruction (all) | CDTF | P-10 | 1-10 | 2-10 |
| exterior training | CDTF | P-10 | 1-10 | 2-10 |
| toxic-agent (interior controlled) | CDTF | P-10 | 1-10 | 2-10 |
| TG 6.4 NBC Survival Recovery [5] | | | | |

| Table 3.3: Relationship of Training Goals and Support Facilities to Site Locations by BRAC Land Use and Facility Alternative | | | | |
|---|---|---|---|---|
| **Training Activity Group (TAG), Training Goals (TG) and Supporting Facilities** | **BRAC Construction Packages [1]** | **BRAC Land Use and Facility Alternatives** | | |
| | **(Same for each alternative Land Use and Facility Plan (LU & FP)** | **Army's Proposed LU & FP (Combined Headquarters & Instruction)** | **Alternative 1 LU & FP (Combined Headquarters)** | **Alternative 2 LU & FP (Separate Headquarters)** |
| | | **Site Location [2]** | **Site Location [2]** | **Site Location [2]** |
| exterior training [8] | Range | P-11 | 1-11 | 2-11 |
| laboratory (radiation) | GIF | P-1 | 1-1 | 2-1A |
| TAG 7. OBSCURANT PROCEDURES | | | | |
| TG 7.1 Obscurant, Employment Principles [5] | | | | |
| TG 7.2 Obscurant, Employment Operations, Basic (Static) [3, 6] | | | | |
| exterior training, static training area [10] | Range | P-12 | 1-12 | 2-12 |
| TG 7.3 Obscurant, Employment Operations (Mobile) [5] | | | | |
| exterior training, mobile/field training areas [9, 11] | Range | P-13, P-14, P-15, & P-16 | 1-13, 1-14, 1-15, & 1-16 | 2-13, 2-14, 2-15 & 2-16 |
| TG 7.4 Obscurant, Employment Operations (Field Training) [5] | | | | |
| exterior training, mobile/field training areas [9, 11] | Range | P-13, P-14, P-15, & P-16 | 1-13, 1-14, 1-15, & 1-16 | 2-13, 2-14, 2-15 & 2-16 |
| TG 7.5 Obscurant, Generator Maintenance | | | | |
| classroom, general instruction (all) | AIF | P-3 | 1-3 | 2-3 |
| exterior training | AIF | P-3 | 1-3 | 2-3 |
| maintenance bay | AIF | P-8 | 1-8 | 2-8 |
| TG 7.6 Obscurant, Storage Operations [5] | | | | |
| exterior training [12] | Range | P-17/17A | 1-17/17A | 2-17/17A |
| TAG 8. RADIATION SAFETY | | | | |
| TG 8.1 Radiation Safety [5] | | | | |
| exterior training [13] | Range | P-11 | 1-11 | 2-11 |
| laboratory (radiation) | GIF | P-1 | 1-1 | 2-1A |
| TG 8.2 Radiation, Test and Operations Equipment Storage | | | | |
| Centralized Storage with satellite locations | GIF | P-1 | 1-1 | 2-1A |
| TAG 9. RESEARCH SUPPORT | | | | |
| TG 9.1 Research support | GIF | P-18 | 1-18 | 2-18 |
| TG 9.2 Specialized/Classified and Museum | | | | |
| Classified material storage | GIF | P-1 | 1-1 | 2-1A |

| Table 3.3: Relationship of Training Goals and Support Facilities to Site Locations by BRAC Land Use and Facility Alternative | | | | |
|---|---|---|---|---|
| **Training Activity Group (TAG), Training Goals (TG) and Supporting Facilities** | **BRAC Construction Packages [1]** | **BRAC Land Use and Facility Alternatives** | | |
| | **(Same for each alternative Land Use and Facility Plan (LU & FP)** | **Army's Proposed LU & FP (Combined Headquarters & Instruction)** | **Alternative 1 LU & FP (Combined Headquarters)** | **Alternative 2 LU & FP (Separate Headquarters)** |
| | | **Site Location [2]** | **Site Location [2]** | **Site Location [2]** |
| Museum artifact storage | AIF | P-19 | 1-19 | 2-19 |
| TAG 10. SMALL ARMS PROCEDURES | | | | |
| TG 10.1 Weapons Training [5] | | | | |
| M60/M240 Range | Range | P-20 | 1-20 | 2-20 |
| Marine NBC Training | Range | P-21 | 1-21 | 2-21 |
| Marine Shotgun | Range | P-22 | 1-22 | 2-22 |
| Mark 19 Familiarization and Qualification Range | Range | P-23 | 1-23 | 2-23 |
| FOX Vehicle Machine Gun Familiarization Range | Range | P-24 | 1-24 | 2-24 |
| Special Reaction Team Marksman/Observer Range | Range | P-25 | 1-25 | 2-25 |
| Special Reaction Team Range | Range | P-26 | 1-26 | 2-26 |
| Range Control, administration | Range | P-27 | 1-27 | 2-27 |
| Range Control, general instruction | Range | P-28 | 1-28 | 2-28 |
| Relocate Range 29 | Range | P-29 | 1-29 | n/a |
| Relocate Range 30 Day/Night | Range | P-30 | 1-30 | 2-30 |
| Relocate Range 30 F | Range | P-31 | n/a | n/a |
| Relocate US Weapons Range 19 | Range | P-32 | 1-32 | 2-32 |
| Relocate Zero Fire (M16) Range | Range | P-33 | 1-33 | 2-33 |
| TG 10.2 Weapons Training, Pistol [5] | | | | |
| 9 mm Pistol (FATS Simulator) | Range | P-34 | 1-34 | 2-34 |
| Marine 9 mm Pistol | Range | P-35 | 1-35 | 2-35 |
| Marine Combat Pistol | Range | P-36 | 1-36 | 2-36 |
| TG 10.3 Weapons Storage [5] | | | | |
| Mock storage facilities | AIF | P-4 | 1-4 | 2-4 |
| TAG 11. VEHICLE OPERATIONS | | | | |
| TG 11.1 Vehicle Operations, Driver Qualification [3] | | | | |
| HMMWV Driving | Range | P-37 | 1-37 | 2-37 |
| TG 11.2 Evasive Driving [5] | | | | |
| Evasive Driving | Range | P-38 | 1-38 | 2-38 |
| TG 11.3 Vehicle Maintenance [5] | | | | |
| exterior training | AIF | P-3 | 1-3 | 2-3 |
| maintenance bay | AIF | P-8 | 1-8 | 2-8 |

**Table 3.3: Relationship of Training Goals and Support Facilities to Site Locations by BRAC Land Use and Facility Alternative**

| Training Activity Group (TAG), Training Goals (TG) and Supporting Facilities | BRAC Construction Packages [1] | BRAC Land Use and Facility Alternatives | | |
|---|---|---|---|---|
| | (Same for each alternative Land Use and Facility Plan (LU & FP) | Army's Proposed LU & FP (Combined Headquarters & Instruction) | Alternative 1 LU & FP (Combined Headquarters) | Alternative 2 LU & FP (Separate Headquarters) |
| | | Site Location [2] | Site Location [2] | Site Location [2] |
| **NOTE - The Following Support Facilities Are Not Related to the Accomplishment of Specific Training Goals, but are Required to Accommodate the Overall Relocation Action** | | | | |
| Administration, 11th Chemical Company | GIF | P-39 | 1-39 | 2-39 |
| Administration, 20th Chemical Detachment | GIF | P-40 | 1-40 | 2-40 |
| Administration, Chemical School | GIF | P-41 | 1-41 | 2-41 |
| Administration, Military Police School | GIF | P-42 | 1-42 | 2-42 |
| Dining Facility (new construction) | UPH | P-43 | n/a | n/a |
| Dining Facility (reactivate 1700/Specker Barracks) | UPH | n/a | 1-44 | n/a |
| Dining Facility (new construction at 1700/Specker Barracks) | UPH | P-44 | n/a | 2-44 |
| Family Housing, General Officers Quarters | GOQ | P-45 | 1-45 | 2-45 |
| UEPH (new construction) | UPH | P-46 | 1-46/46A | 2-46/46A |
| UEPH (reallocation 1700/Specker Barracks) | UPH | P-47 | 1-47 | 2-47 |
| UEPH (reallocation 1000 area) | UPH | P-48 | 1-48 | 2-48 |
| UEPH (reallocation 800 area) | UPH | P-49 | 1-49 | 2-49 |
| UEPH (reallocation 700 area) | UPH | P-50 | 1-50 | 2-50 |
| UEPH (reallocation 600 area) | UPH | P-51 | 1-51 | 2-51 |
| UEPH (convert Family Housing) | Convert | P-52 [1] | n/a | n/a |
| UOPH (new construction) | n/a | n/a | 1-53 | 2-53 |
| UOPH (convert existing transient) | Convert | P-54 [1] | n/a | 2-54 |
| UOPH (convert Family Housing) | Convert | P-55 [1] | n/a | n/a |
| Vehicle Maintenance (DOL Maintenance) | AIF | P-56 | 1-56 | 2-56 |
| Vehicle Maintenance (unit motor pool) | AIF | P-57 [1] | 1-57 | 2-57 [1]/57A |
| Warehouse/Supply Storage | AIF | P-58 [1] | 1-58 | 2-58 |

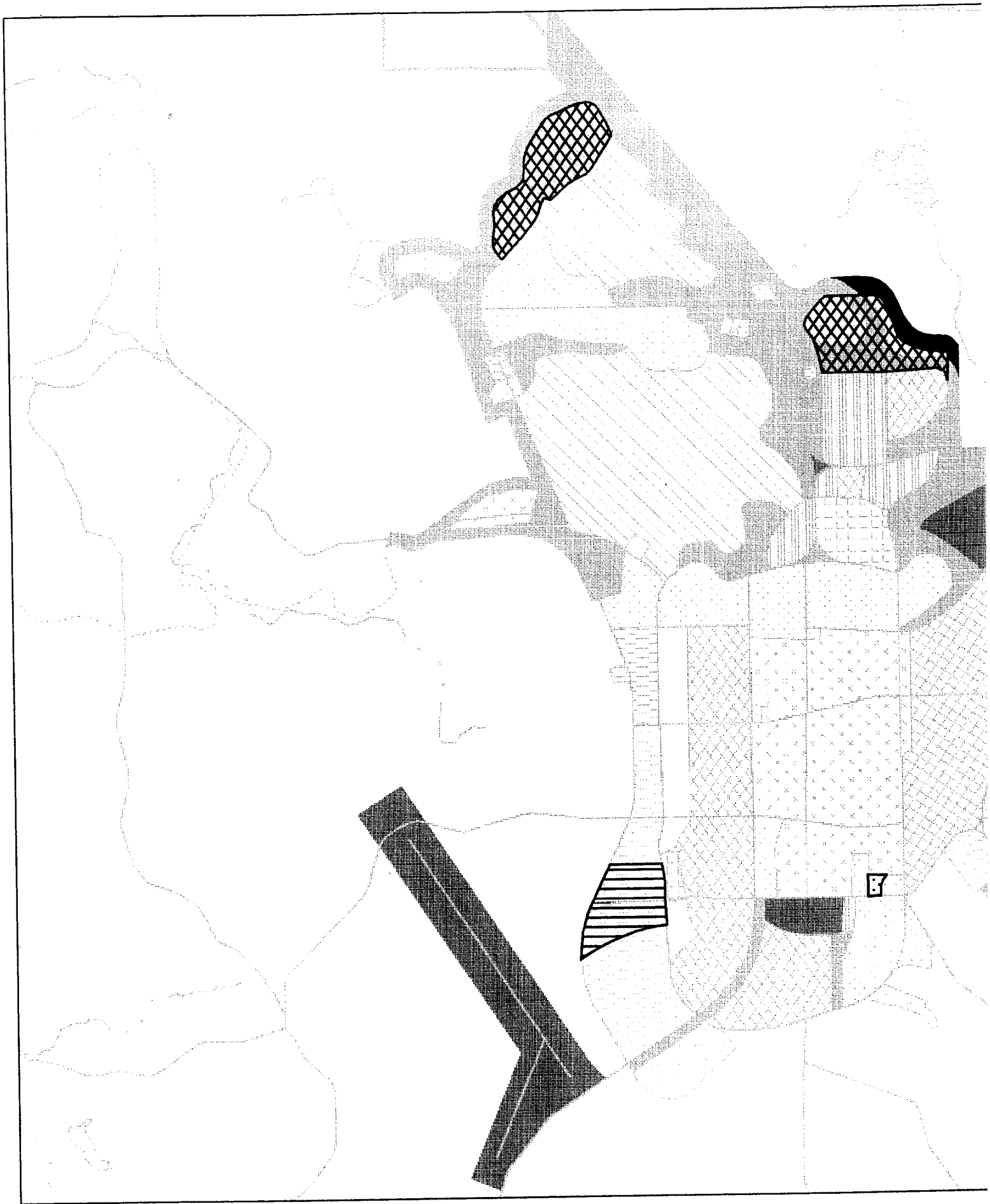
**Notes:**

1 BRAC Construction Packages (Total of 8) are described in Detail in Volume III, Appendix C. Construction Package Names are abbreviated in this table are as follows: 1) **AIF** = Applied Instruction Facility (Project 46091); 2) **CDTF** = Chemical Defense Training Facility (Project 45893); 3) **Convert** = Convert Housing (Project 46540); 4) **GIF** = General Instruction Facility (Project 46090); 5) **GOQ** = General Officer Quarters (Project 38174); 6) **MOUT** = Military Operations in Urbanized Terrain Facility (Project 45892); 7) **Range** = Training Range Modifications (Project 46094); and 8) **UPH** = Unaccompanied Personnel Housing (Project 46092).

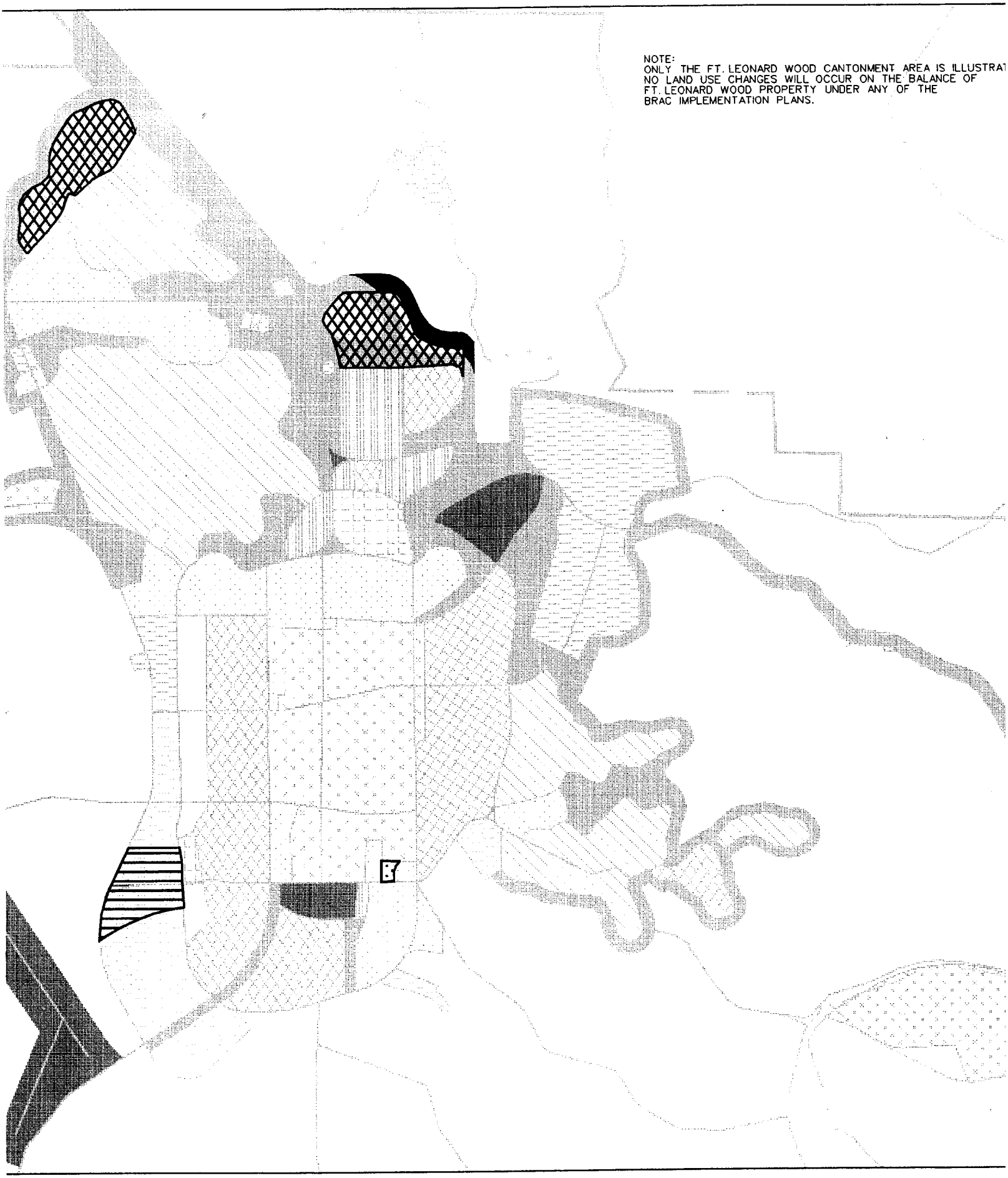
2 Site numbers (P-1, P-2, etc.) refer to site location numbers illustrated on schematic location maps (Figures 3.3, 3.5, 3.7)

3 This training objective will include the use of grenade and smoke pot based obscurant systems. Locations for the use of these items are defined in FLW Regulation 214-10 (FLW, 1993a). These locations will be restricted to Training Areas (TA) 125, TA 126, TA 148, TA 194, TA 233, TA 234, TA 237, TA 238, TA 238B, TA 240N, TA 240S, TA 241, TA 270, TA 271, TA 272, TA 273, Ballard Hollow, the Sapper Range, Range 28, Range 33, Firing Point 7 and the "road". Analysis of impacts associated with the use of grenades and smoke pots will be based on a 1,000-meter diameter usage location.

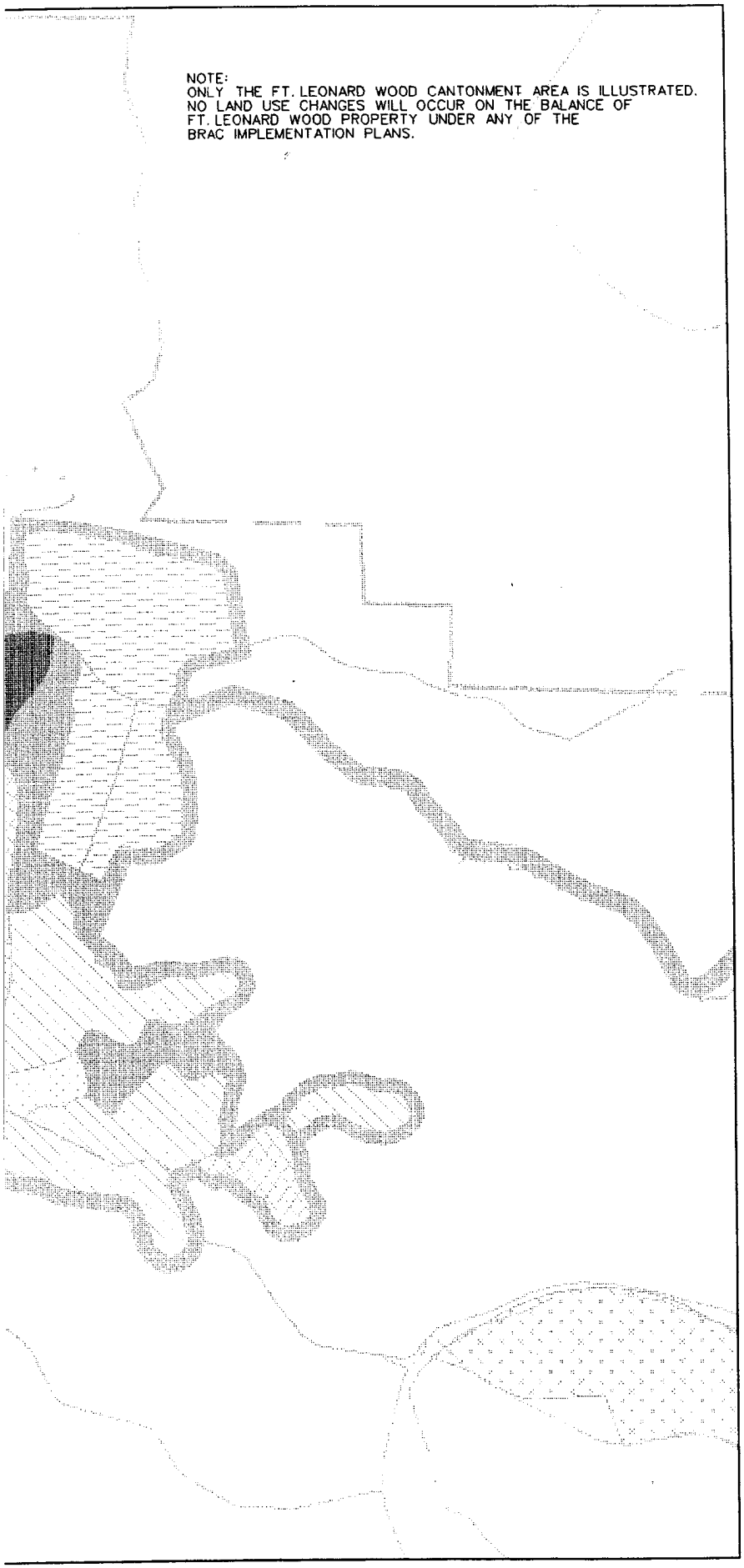
| Table 3.3: Relationship of Training Goals and Support Facilities to Site Locations by BRAC Land Use and Facility Alternative | | | | |
|---|---|---|---|---|
| **Training Activity Group (TAG), Training Goals (TG) and Supporting Facilities** | **BRAC Construction Packages [1]** | **BRAC Land Use and Facility Alternatives** | | |
| | **(Same for each alternative Land Use and Facility Plan (LU & FP)** | **Army's Proposed LU & FP (Combined Headquarters & Instruction)** | **Alternative 1 LU & FP (Combined Headquarters)** | **Alternative 2 LU & FP (Separate Headquarters)** |
| | | **Site Location [2]** | **Site Location [2]** | **Site Location [2]** |
| 4 | Existing range, field and maneuver areas are assigned as needed for use in accordance with FLW 210-14 (FLW, 1993a) to support training requirements. Depending upon other training requirements various existing areas could be used to support this training objective. BRAC actions will be restricted by existing management zones and along the Big Piney River and Roubidoux Creek. | | | |
| 5 | Classroom, general instruction areas for officers, NCO, Chemical OSUT and MP OSUT are collocated with the general instruction classrooms for TG 1.2, Maneuver Operations | | | |
| 6 | In addition to the areas designated in note 3 above for the use of grenade based obscurant systems, this training objective will develop a new area that will be authorized for the use of grenade obscurants. The use of grenades at this new area will be limited to within the exterior boundaries of this area. | | | |
| 7 | The EPTM Alternative does not include classroom instruction in this training objective, instruction will be provided at the field/maneuver area only. | | | |
| 8 | The RCP Alternative would require construction of an outdoor alpha field training area, other training methods would use existing areas. | | | |
| 9 | In addition to the areas designated in Note 3 above for the use of smoke pot obscurant systems, this training objective will develop four new areas that will be authorized for the use of smoke pots. The use of smoke pots will be limited to within the exterior boundaries of these areas. | | | |
| 10 | This TG will establish one of five new fog oil obscurant training areas. | | | |
| 11 | This TG will result in the establishment of four (out of a total of five) new fog oil obscurant training areas. As discussed in subsection C.4.2.1.4 the nature of this type of training requires the selection of natural drainage valleys since this type of terrain is necessary to meet smoke training mission requirements. | | | |
| 12 | The RCP Alternative includes two uncovered storage areas, the OPTM (Army's Proposed Action) Alternative includes two covered storage areas, and the EPTM Alternative includes only one covered storage area. | | | |
| 13 | The RCP Alternative would include construction of an alpha field. The OPTM (Army's Proposed Action) Alternative and the EPTM Alternative would prohibit exterior training with unsealed radiological isotopes; therefore these alternatives would not require construction of an alpha field. | | | |
| *Source:* | *Harland Bartholomew & Associates, Inc.* | | | |



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NOTE:
ONLY THE FT. LEONARD WOOD CANTONMENT AREA IS ILLUSTRAT
NO LAND USE CHANGES WILL OCCUR ON THE BALANCE OF
FT. LEONARD WOOD PROPERTY UNDER ANY OF THE
BRAC IMPLEMENTATION PLANS.




## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM

| BRAC CHANGES | EXISTING CONDITIONS | LAND USE CLASSIFICATION |
|---|---|---|
| | | ADMINISTRATION |
| | | COMMUNITY FACILITIES |
| | | FAMILY HOUSING |
| | | INDUSTRIAL |
| | | MEDICAL |
| | | OPERATIONS |
| | | TRAINING |
| | | TROOP HOUSING |
| | | RECREATION |
| | | RESERVED / BUFFER |

SOURCE MATERIAL:
HBA, 1991b
Master Plan for the USAEC and FLW

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2000 1000 0 2000

Scale in Feet

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KANSAS CITY DISTRICT
US ARMY CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

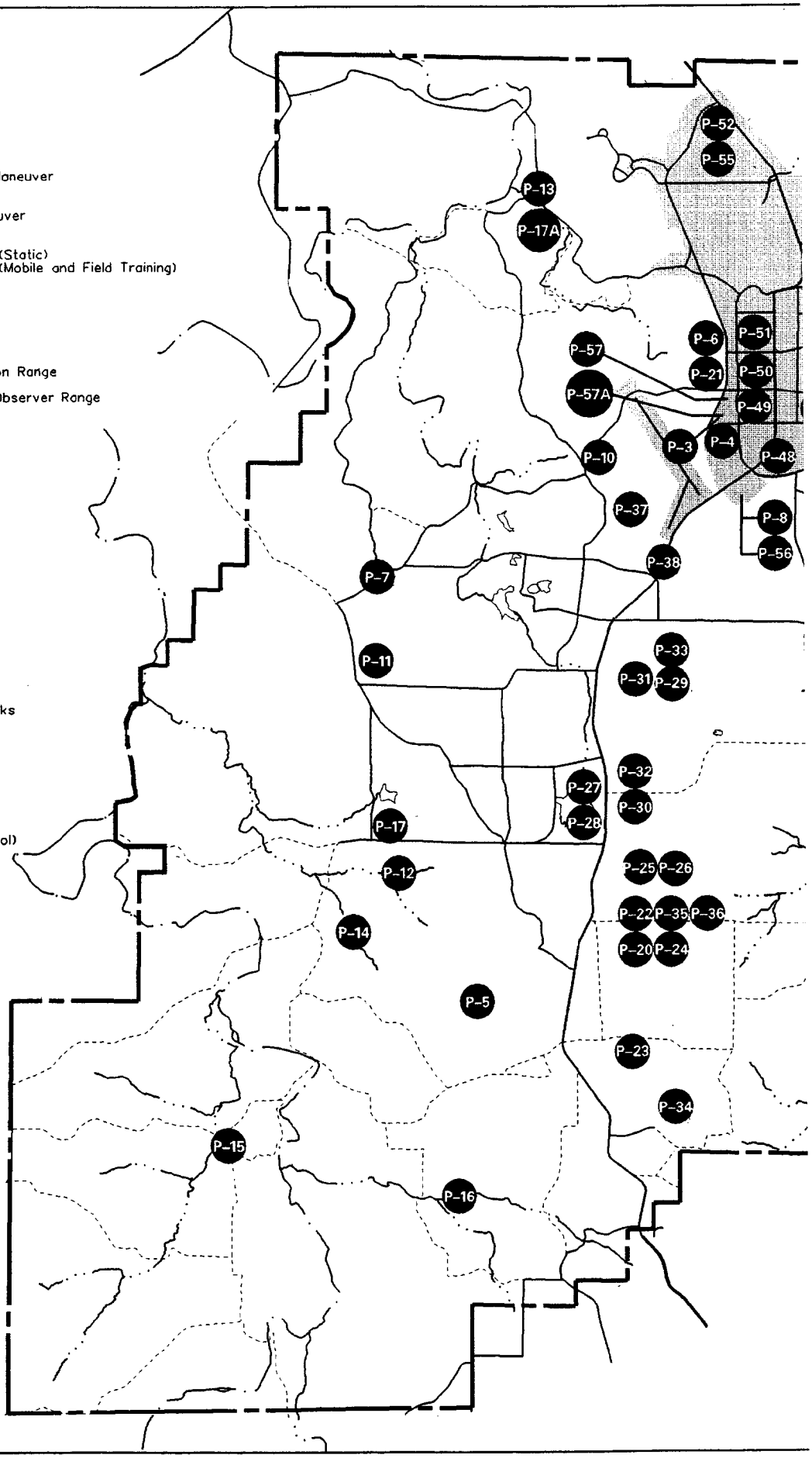
RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ARMY'S PROPOSED BRAC LAND USE PLAN (COMBINED HEADQUARTERS & INSTRUCTION)**

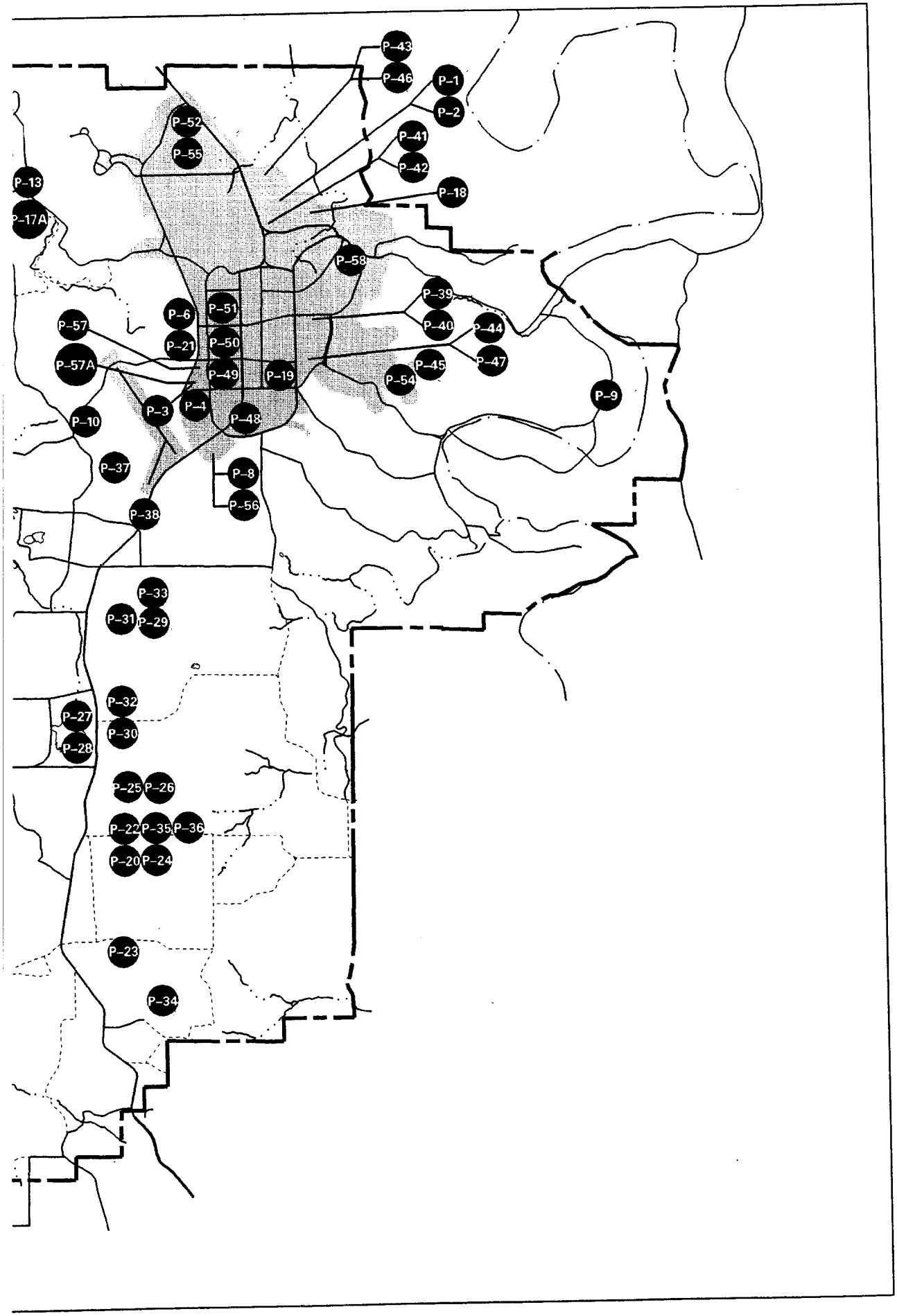
**DATE: MARCH, 1997** | **FIGURE NO. 3.2**

Facility Project Sites

| Number | Description |
|---|---|
| **Training Facilities** | |
| P-1 | General Instruction Facility (Officer) |
| P-2 | NCO Academy |
| P-3 | DATF (Chemical OSUT) |
| P-4 | Military Police Village (MP OSUT) |
| P-5 | Flame Field Expedient Range |
| P-6 | NBC Warning and Reporting Field/Maneuver |
| P-7 | MOUT Facility |
| P-8 | BIDS Maintenance Demonstration |
| P-9 | FOX Swim (Amphibious) Field/Maneuver |
| P-10 | CDTF (Toxic Agent Training) |
| P-11 | NBC Survival Recovery |
| P-12 | Obscurant, Employment Operations (Static) |
| P-13, P-14, P-15, & P-16 | Obscurant, Employment Operations (Mobile and Field Training) |
| P-17/17A | Obscurant, Storage |
| P-18 | Research Support |
| P-19 | Museum Artifact Storage |
| P-20 | M60/M240 Range |
| P-21 | Marine NBC Training |
| P-22 | Marine Shotgun |
| P-23 | MK19 Familiarization and Qualification Range |
| P-24 | FOX Vehicle Familiarization Range |
| P-25 | Special Reaction Team Marksman/Observer Range |
| P-26 | Special Reaction Team Range |
| P-27 | Range Control, Administration |
| P-28 | Range Control, General Instruction |
| P-29 | Relocate Range 29 |
| P-30 | Relocate Range 30 Day/Night |
| P-31 | Relocate Range 30 F |
| P-32 | Relocate US Weapons Range 19 |
| P-33 | Relocate Zero Fire (M16) Range |
| P-34 | 9mm Pistol (FATS Simulator) |
| P-35 | Marine 9mm Pistol |
| P-36 | Marine Combat Pistol |
| P-37 | HMMWV Driving |
| P-38 | Evasive Driving |
| **Support Facilities** | |
| P-39 | Admin., 11th Chemical Company |
| P-40 | Admin., 20th Chemical Detachment |
| P-41 | Admin., Chemical School |
| P-42 | Admin., Military Police School |
| P-43 | Dining Facility (New Construction) |
| P-44 | Dining Facility (Reactivate) |
| P-45 | General Officers Quarters |
| P-46 | UEPH, E (New Construction) |
| P-47 | UEPH, E Reallocate Speaker Barracks |
| P-48 | UEPH, E Reallocate 1000 Area |
| P-49 | UEPH, E Reallocate 800 Area |
| P-50 | UEPH, E Reallocate 700 Area |
| P-51 | UEPH, E Reallocate 600 Area |
| P-52 | UEPH, E Convert Family Housing |
| n/a | UOPH (New Construction) |
| P-54 | UOPH (Convert Transient) |
| P-55 | UOPH (Convert Housing) |
| P-56 | Vehicle Maintenance (DOL) |
| P-57/57A | Vehicle Maintenance (Unit Motor Pool) |
| P-58 | Warehouse/Supply Storage |




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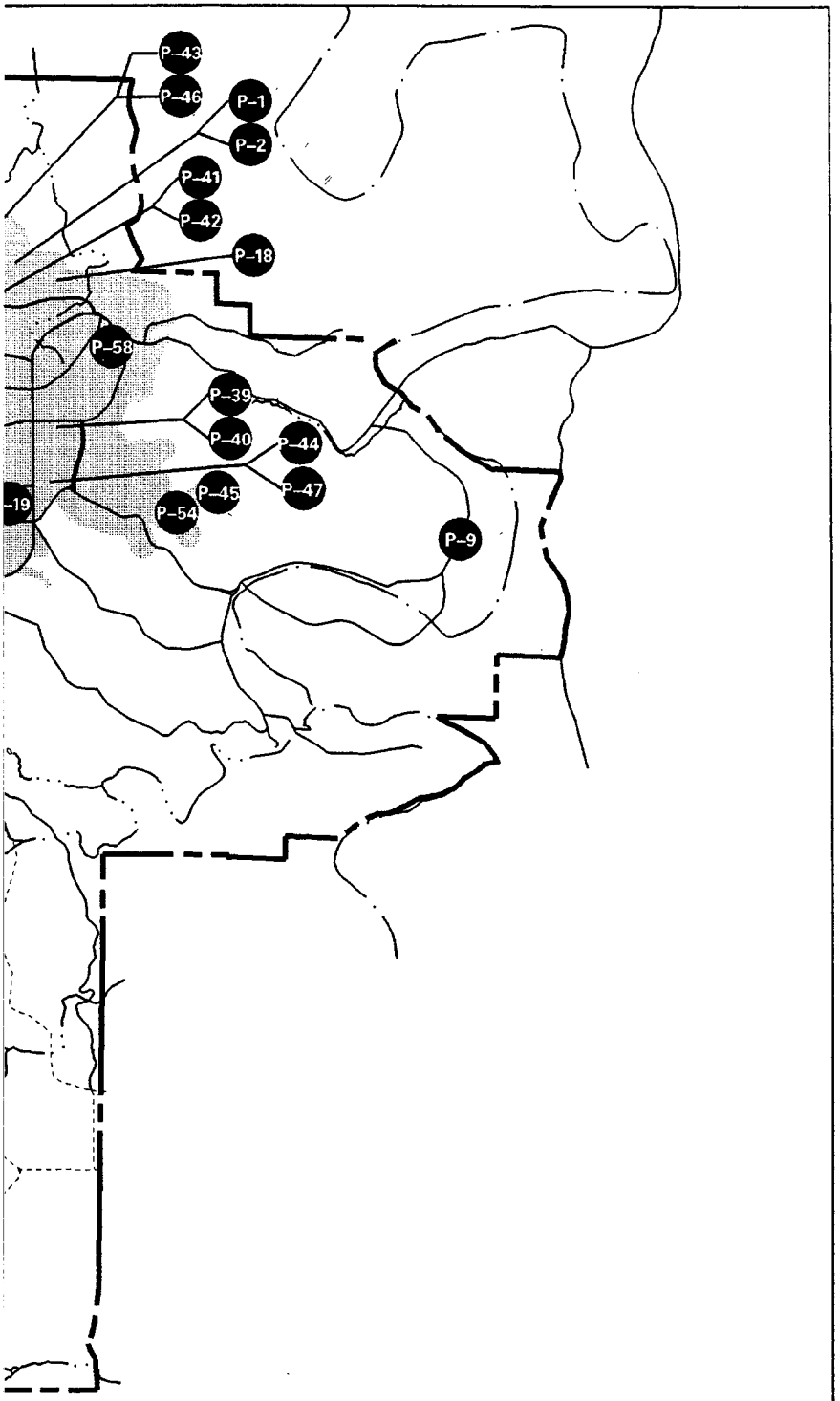
HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

ENVIRONMENTAL I

RELOCATION OF U.S. A
AND U.S. ARMY MILITAI
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& INST**

**DATE: MARCH, 1997**




## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- CANTONMENT AREA

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Scale in Miles

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

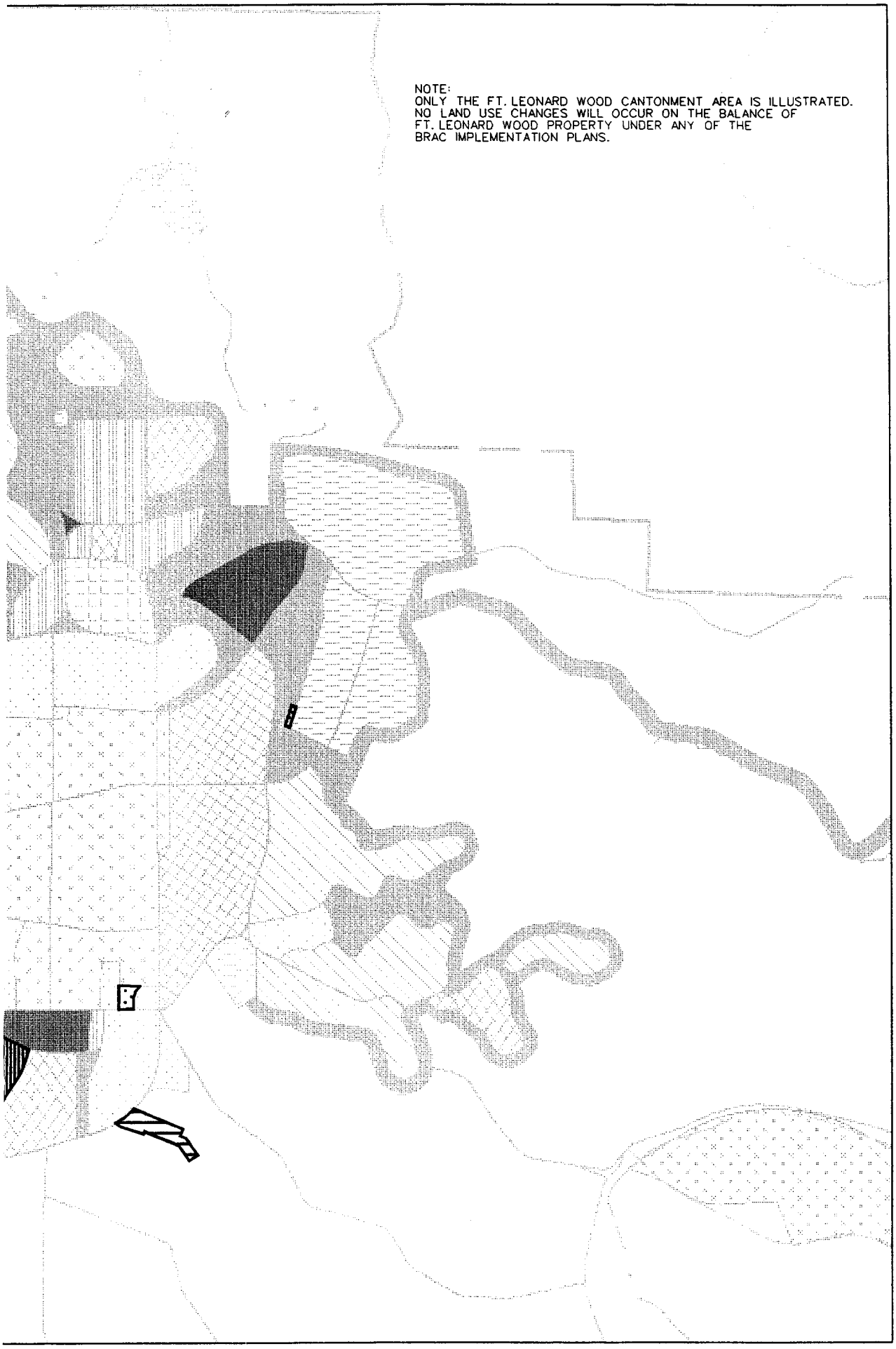
RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ARMY'S PROPOSED BRAC FACILITY SITING PLAN (COMBINED HEADQUARTERS & INSTRUCTION)**

**DATE: MARCH, 1997** | **FIGURE NO. 3.3**



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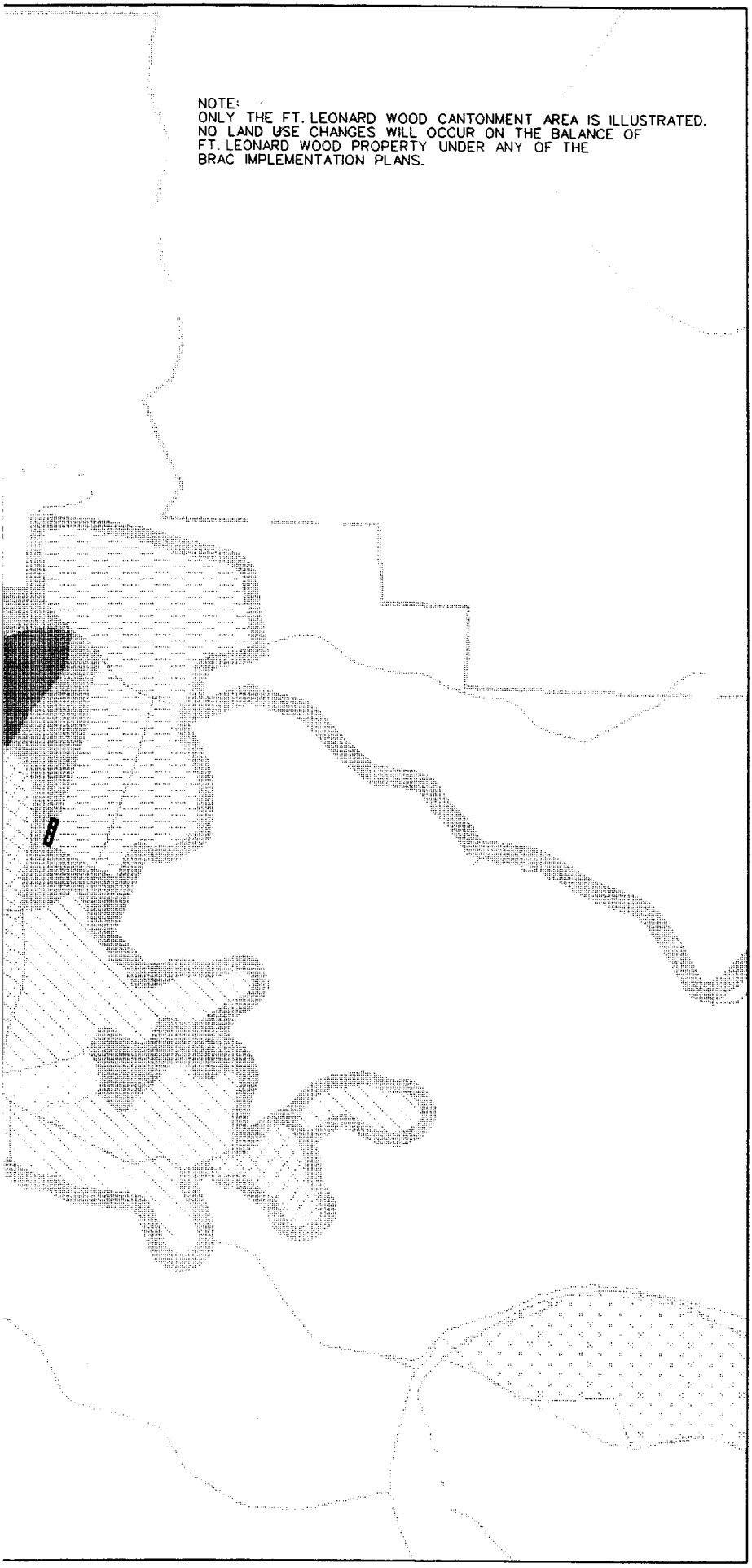
HARLAND BARTHOLOMEW & ASSOCIATES, INC
ST LOUIS, MISSOURI

ENVIRONMENTAL

RELOCATION OF U.S.
AND U.S. ARMY MILITA
FORT LEONARD

**ALTE**
**BRAC LA**
**(COMBINED**

**DATE: MARCH, 1997**




## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM

| BRAC CHANGES | EXISTING CONDITIONS | LAND USE CLASSIFICATION |
|---|---|---|
| | | ADMINISTRATION |
| | | COMMUNITY FACILITIES |
| | | FAMILY HOUSING |
| | | INDUSTRIAL |
| | | MEDICAL |
| | | OPERATIONS |
| | | TRAINING |
| | | TROOP HOUSING |
| | | RECREATION |
| | | RESERVED / BUFFER |

SOURCE MATERIAL:
HBA, 1991b
Master Plan for the USAEC and FLW

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2000 1000 0 2000
Scale in Feet

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

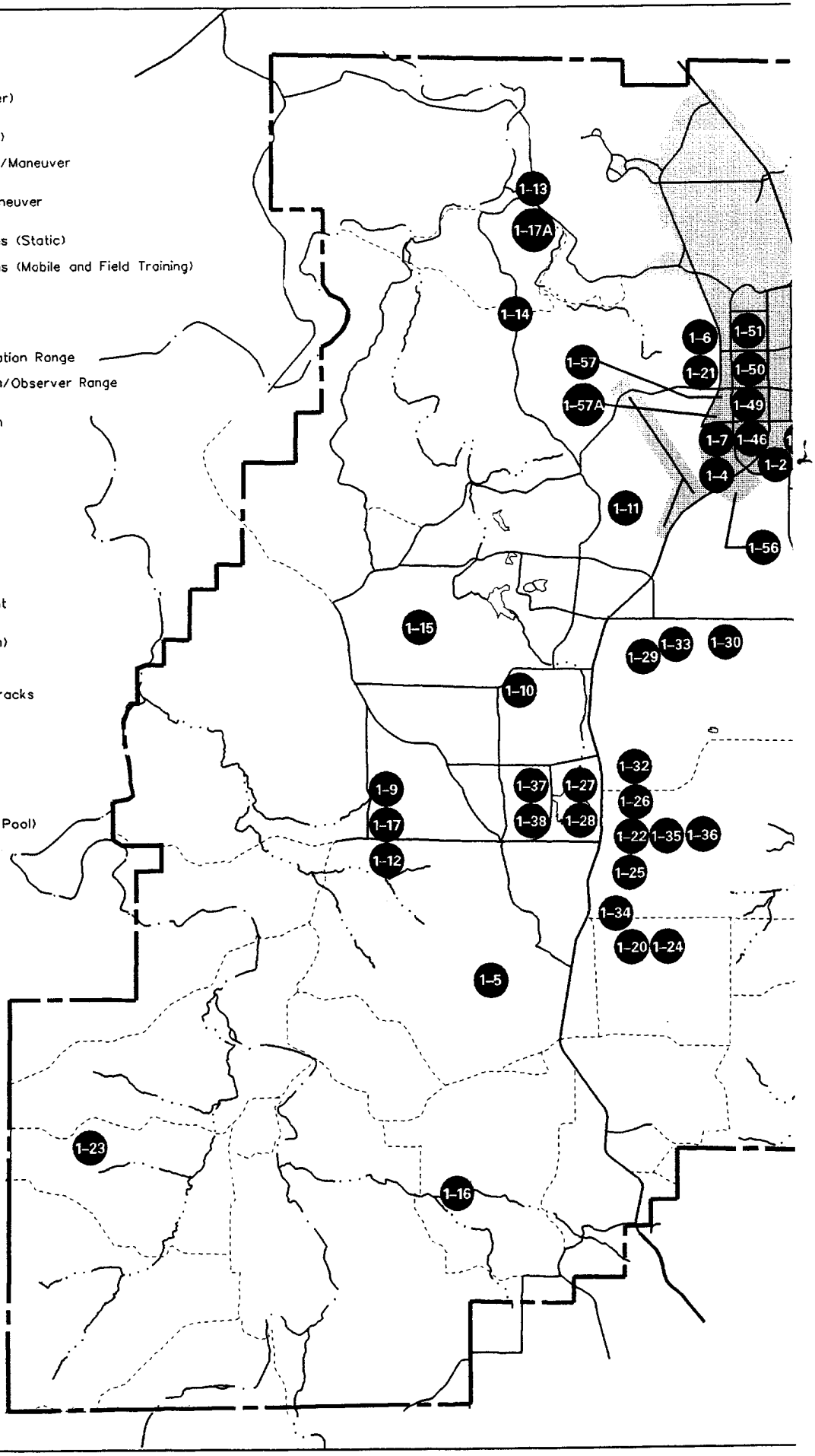
RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ALTERNATIVE 1**
**BRAC LAND USE PLAN**
**(COMBINED HEADQUARTERS)**

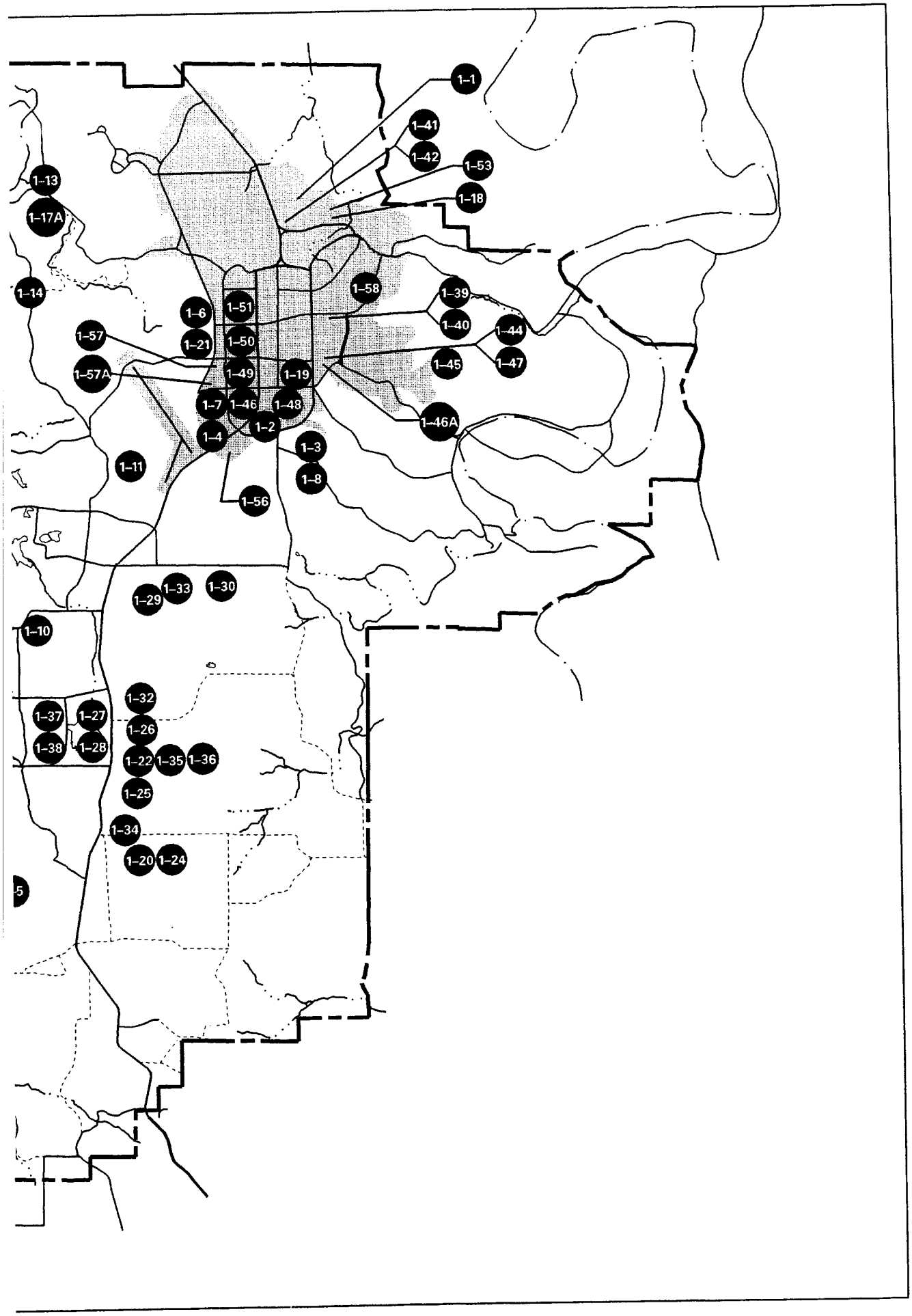
**DATE: MARCH, 1997** | **FIGURE NO. 3.4**

Facility Project Sites

| Number | Description |
|---|---|
| **Training Facilities** | |
| 1-1 | General Instruction Facility (Officer) |
| 1-2 | NCO Academy |
| 1-3 | DATF (Chemical OSUT) |
| 1-4 | Military Police Village (MP OSUT) |
| 1-5 | Flame Field Expedient Range |
| 1-6 | NBC Warning and Reporting Field/Maneuver |
| 1-7 | MOUT Facility |
| 1-8 | BIDS Maintenance Demonstration |
| 1-9 | FOX Swim (Amphibious) Filed/Maneuver |
| 1-10 | CDTF (Toxic Agent Training) |
| 1-11 | NBC Survival Recovery |
| 1-12 | Obscurant, Employment Operations (Static) |
| 1-13, 1-14, 1-15, & 1-16 | Obscurant, Employment Operations (Mobile and Field Training) |
| 1-17/17A | Obscurant, Storage |
| 1-18 | Research Support |
| 1-19 | Museum Artifact Storage |
| 1-20 | M60/M240 Range |
| 1-21 | Marine NBC Training |
| 1-22 | Marine Shotgun |
| 1-23 | MK19 Familiarization and Qualification Range |
| 1-24 | FOX Vehicle Familiarization |
| 1-25 | Special Reaction Team Marksman/Observer Range |
| 1-26 | Special Reaction Team Range |
| 1-27 | Range Control, Administration |
| 1-28 | Range Control, General Instruction |
| 1-29 | Relocate Range 29 |
| 1-30 | Relocate Range 30 Day/Night |
| n/a | Relocate Range 30 F |
| 1-32 | Relocate US Weapons Range 19 |
| 1-33 | Relocate Zero Fire (M16) Range |
| 1-34 | 9mm Pistol (FATS Simulator) |
| 1-35 | Marine 9mm Pistol |
| 1-36l | Marine Combat Pistol |
| 1-37 | HMMWV Driving |
| 1-38 | Evasive Driving |
| **Support Facilities** | |
| 1-39 | Admin., 11th Chemical Company |
| 1-40 | Admin., 20th Chemical Detachment |
| 1-41 | Admin., Chemical School |
| 1-42 | Admin., Military Police School |
| n/a | Dining Facility (New Construction) |
| 1-44 | Dining Facility (Reactivate) |
| 1-45 | General Officers Quarters |
| 1-46/46A | UEPH, E (New Construction) |
| 1-47 | UEPH, E Reallocate Speaker Barracks |
| 1-48 | UEPH, E Reallocate 1000 area |
| 1-49 | UEPH, E Reallocate 800 area |
| 1-50 | UEPH, E Reallocate 700 area |
| 1-51 | UEPH, E Reallocate 600 area |
| n/a | UEPH, E Convert Family Housing |
| 1-53 | UOPH (New Construction) |
| n/a | UOPH (Convert Existing) |
| n/a | UOPH (Convert Housing) |
| 1-56 | Vehicle Maintenance (DOL) |
| 1-57/57A | Vehicle Maintenance (Unit Motor Pool) |
| 1-58 | Warehouse/Supply Storage |




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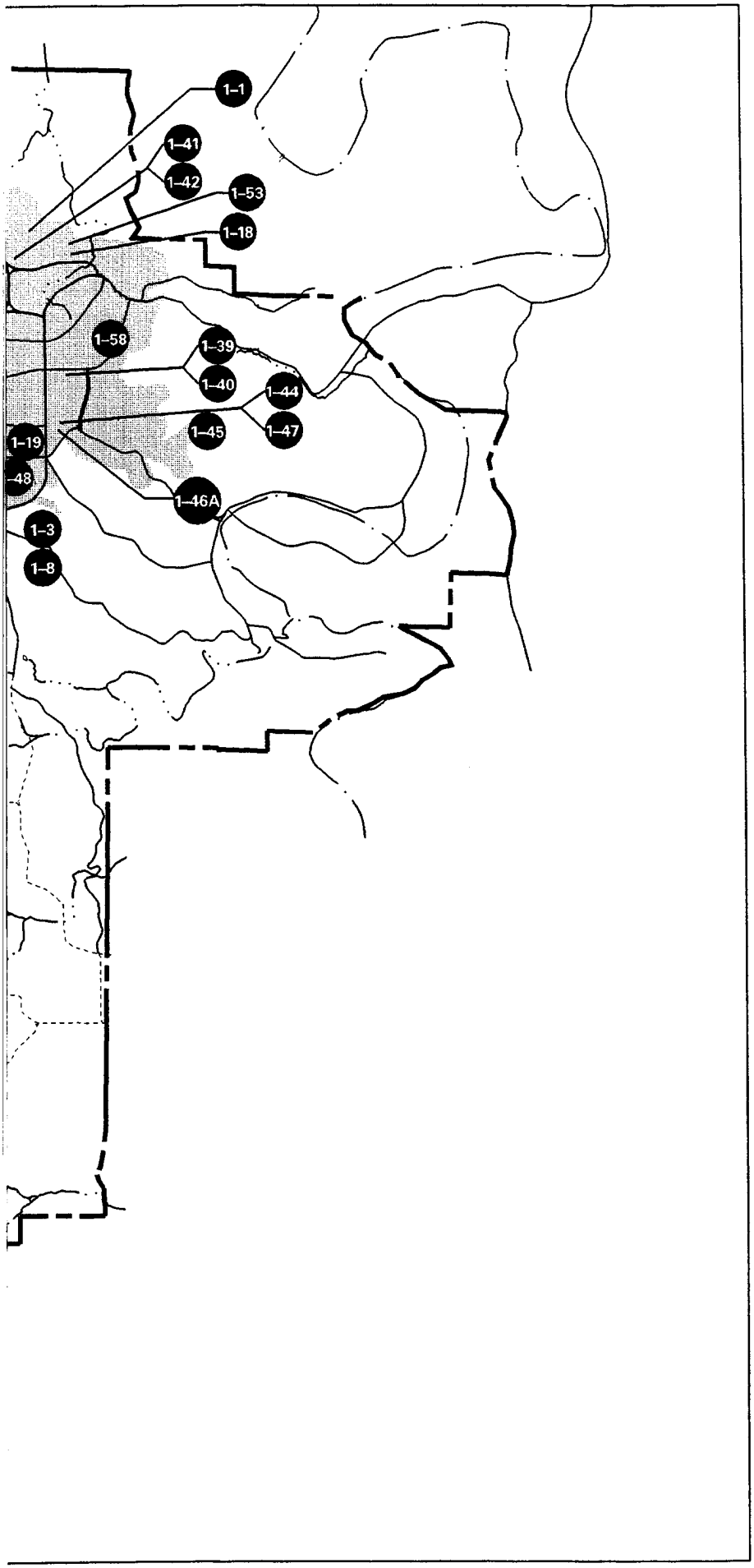
HARLAND BARTHOLOMEW & ASSOCIATES, INC
ST LOUIS, MISSOURI

ENVIRONMENTA

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AND U.S. ARMY MIL
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(COMBINED**

**DATE: MARCH, 199**




## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- CANTONMENT AREA

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Scale in Miles

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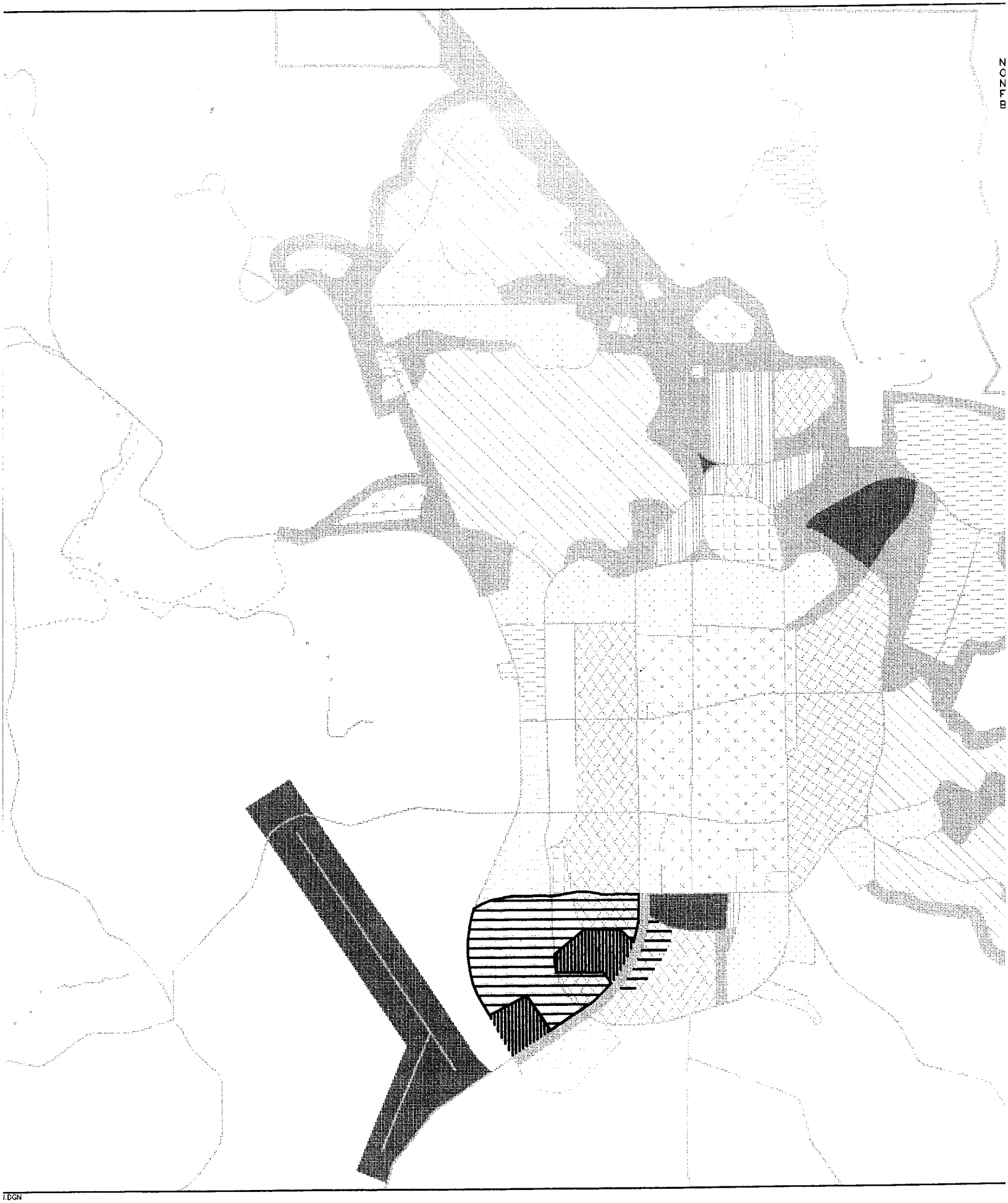
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ENVIRONMENTAL IMPACT STATEMENT

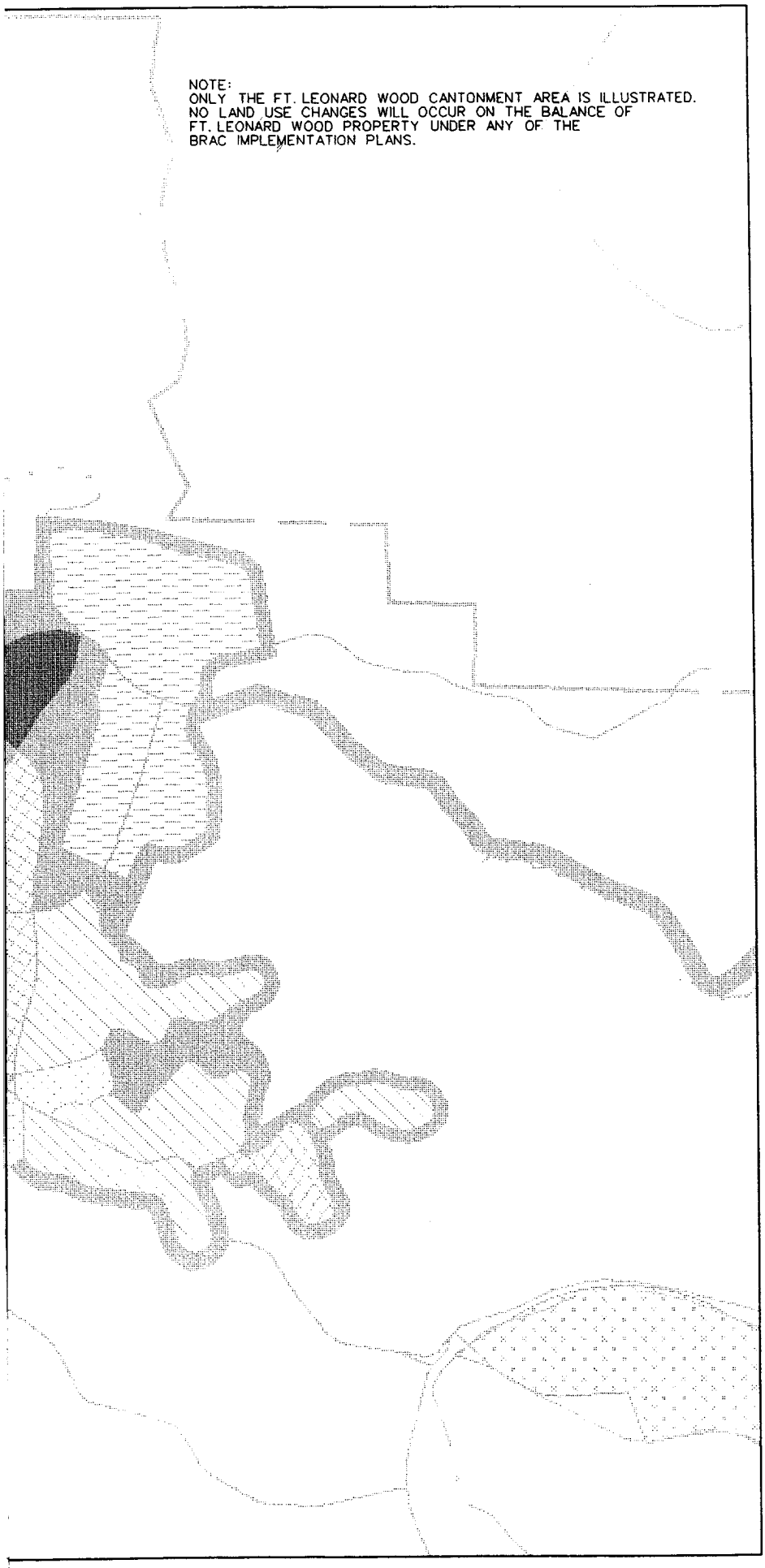
RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ALTERNATIVE 1**
**BRAC FACILITY SITING PLAN**
**(COMBINED HEADQUARTERS)**

**DATE: MARCH, 1997** | **FIGURE NO. 3.5**



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## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM

| BRAC CHANGES | EXISTING CONDITIONS | LAND USE CLASSIFICATION |
|---|---|---|
| | | ADMINISTRATION |
| | | COMMUNITY FACILITIES |
| | | FAMILY HOUSING |
| | | INDUSTRIAL |
| | | MEDICAL |
| | | OPERATIONS |
| | | TRAINING |
| | | TROOP HOUSING |
| | | RECREATION |
| | | RESERVED / BUFFER |

SOURCE MATERIAL:
HBA, 1991b
Master Plan for the USAEC and FLW

N

2000 1000 0 2000
Scale in Feet

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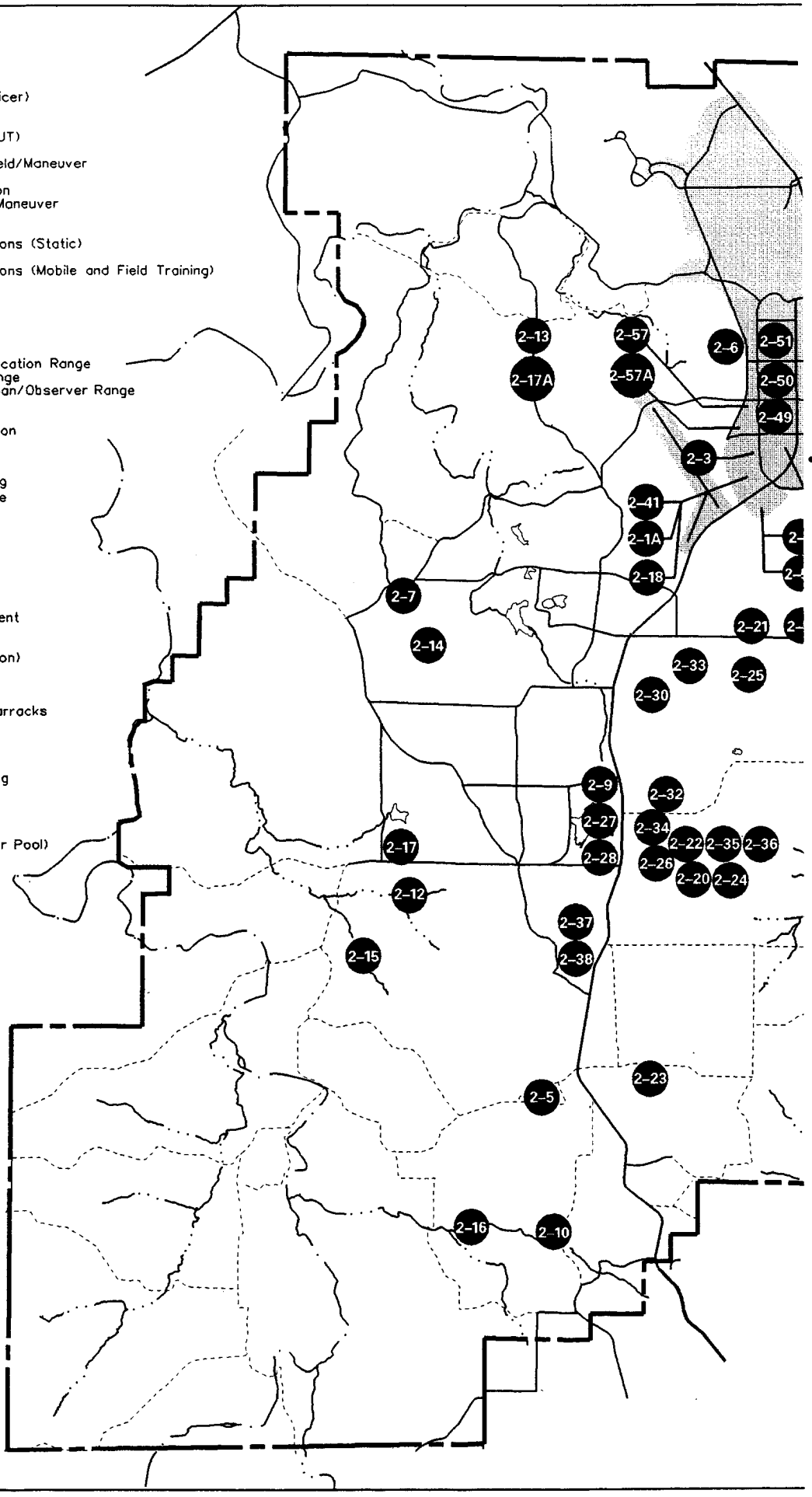
RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ALTERNATIVE 2**
**BRAC LAND USE PLAN**
**(SEPARATE HEADQUARTERS)**

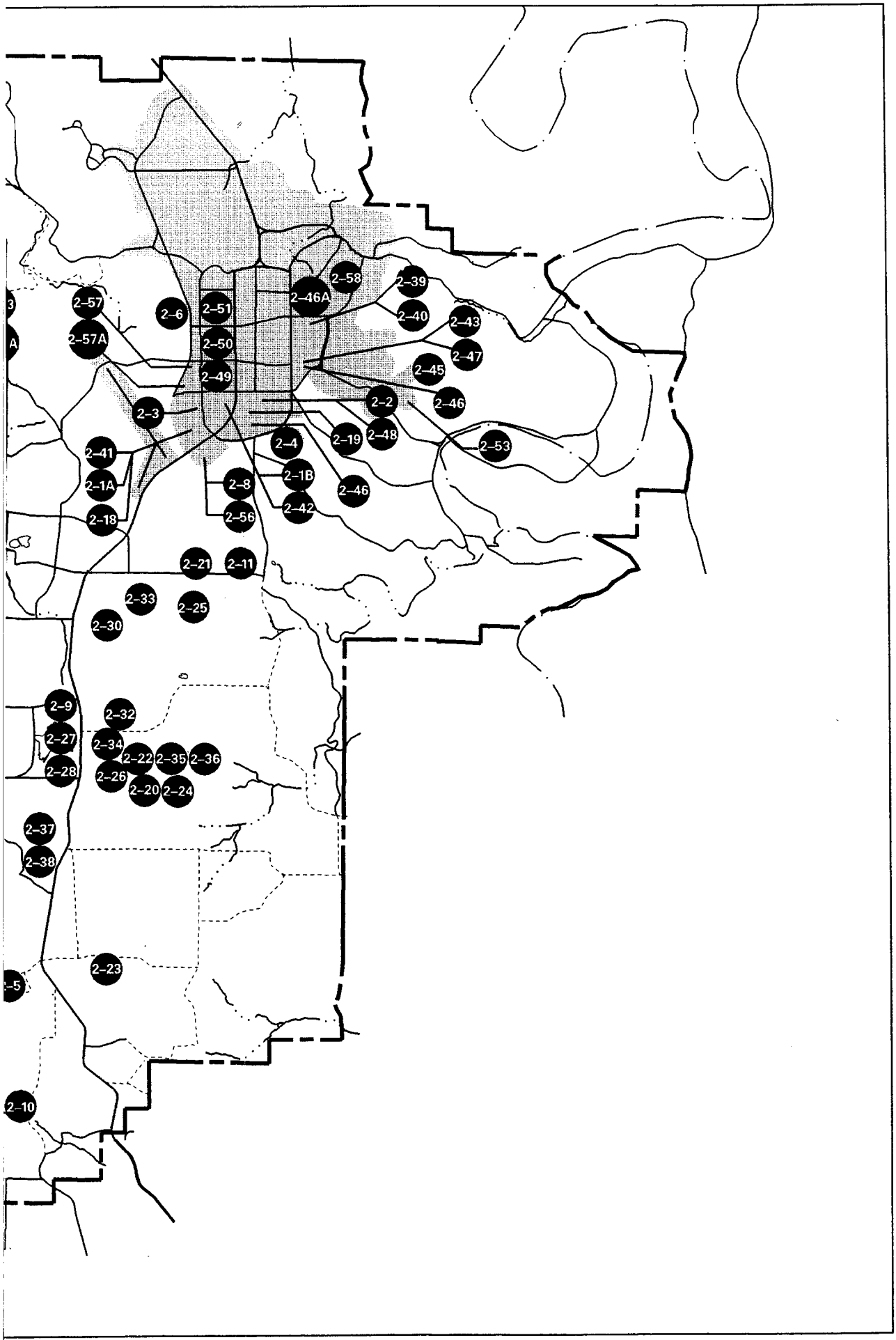
**DATE: MARCH, 1997** | **FIGURE NO. 3.6**

Facility Project Sites

| Number | Description |
|---|---|
| **Training Facilities** | |
| 2-1/1B | General Instruction Facility (Officer) |
| 2-2 | NCO Academy |
| 2-3 | DATF (Chemical OSUT) |
| 2-4 | Military Police Village (MP OSUT) |
| 2-5 | Flame Field Expedient Range |
| 2-6 | NBC Warning and Reporting Field/Maneuver |
| 2-7 | MOUT Facility |
| 2-8 | BIDS Maintenance Demonstration |
| 2-9 | FOX Swim (Amphibious) Filed/Maneuver |
| 2-10 | CDTF (Toxic Agent Training) |
| 2-11 | NBC Survival Recovery |
| 2-12 | Obscurant, Employment Operations (Static) |
| 2-13, 2-14, 2-15 & 2-16 | Obscurant, Employment Operations (Mobile and Field Training) |
| 2-17/17A | Obscurant, Storage |
| 2-18 | Research Support |
| 2-19 | Museum Artifact Storage |
| 2-20 | M60/M240 Range |
| 2-21 | Marine NBC Training |
| 2-22 | Marine Shotgun |
| 2-23 | MK19 Familiarization and Qualification Range |
| 2-24 | FOX Vehicle Familiarization Range |
| 2-25 | Special Reaction Team Marksman/Observer Range |
| 2-26 | Special Reaction Team Range |
| 2-27 | Range Control, Administration |
| 2-28 | Range Control, General Instruction |
| n/a | Relocate Range 29 |
| 2-30 | Relocate Range 30 Day/Night |
| n/a | Relocate Range 30 F |
| 2-32 | Relocate US Weapons Range 19 |
| 2-33 | Relocate Zero Fire (M16) Range |
| 2-34 | 9mm Pistol (FATS Simulator) |
| 2-35 | Marine 9mm Pistol |
| 2-36 | Marine Combat Pistol |
| 2-37 | HMMWV Driving |
| 2-38 | Evasive Driving |
| **Support Facilities** | |
| 2-39 | Admin., 11th Chemical Company |
| 2-40 | Admin., 20th Chemical Detachment |
| 2-41 | Admin., Chemical School |
| 2-42 | Admin., Military Police School |
| 2-43 | Dining Facility (New Construction) |
| n/a | Dining Facility (Reactivate) |
| 2-45 | General Officers Quarters |
| 2-46/46A | UEPH, E (New Construction) |
| 2-47 | UEPH, E Reallocate Speaker Barracks |
| 2-48 | UEPH, E Reallocate 1000 area |
| 2-49 | UEPH, E Reallocate 800 area |
| 2-50 | UEPH, E Reallocate 700 area |
| 2-51 | UEPH, E Reallocate 600 area |
| n/a | UEPH, E Convert Family Housing |
| 2-53 | UOPH (New Construction) |
| n/a | UOPH (Convert Existing) |
| n/a | UOPH (Convert Housing) |
| 2-56 | Vehicle Maintenance (DOL) |
| 2-57/57A | Vehicle Maintenance (Unit Motor Pool) |
| 2-58 | Warehouse/Supply Storage |




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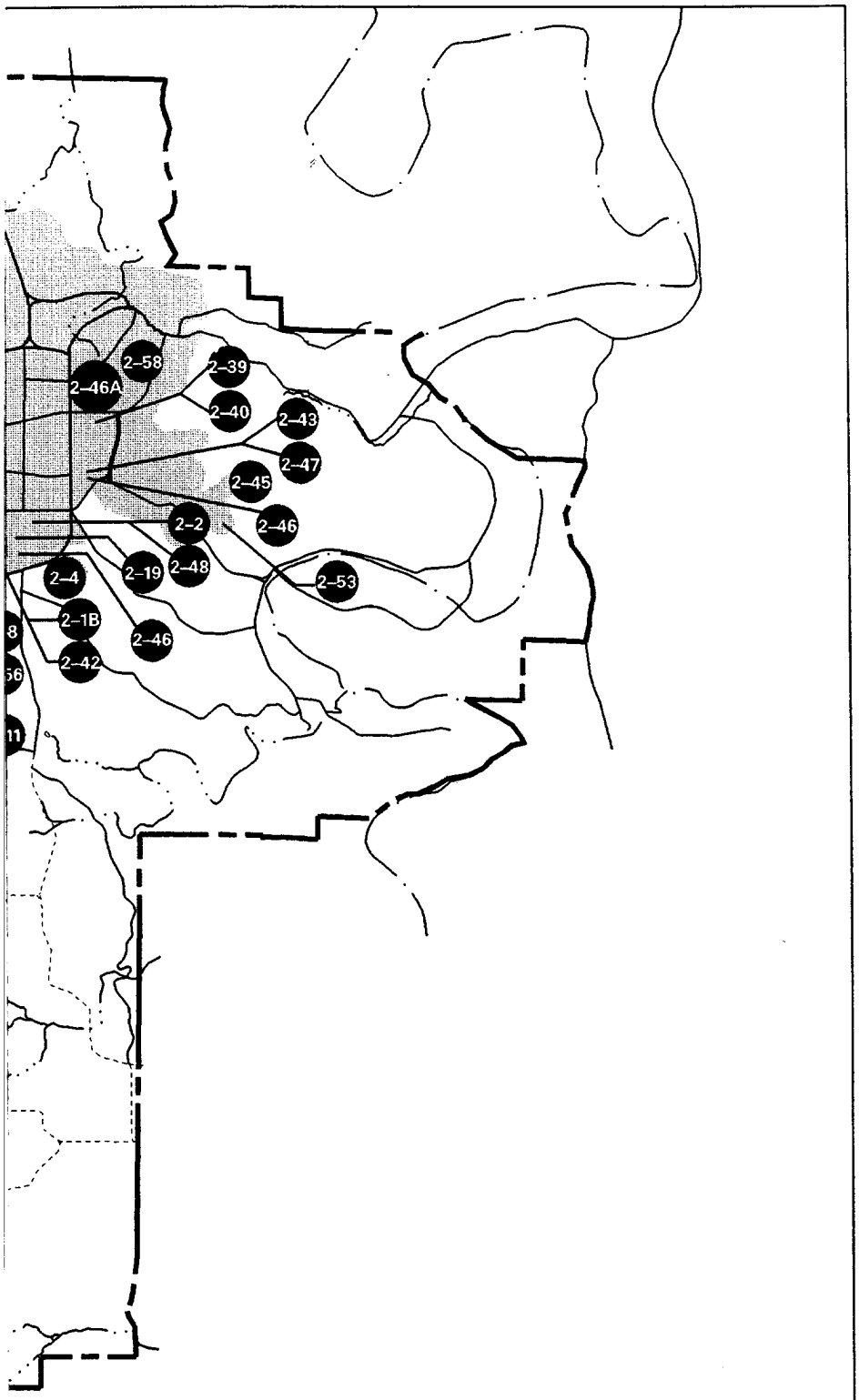
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ENVIRONMENTAL I

RELOCATION OF U.S. A
AND U.S. ARMY MILITA
FORT LEONARD

**ALTERN**
**BRAC FACILIT**
**(SEPARATE HI**

**DATE: MARCH, 1997**




LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- CANTONMENT AREA

N

0 1 2 3

Scale in Miles

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ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ALTERNATIVE 2**
**BRAC FACILITY SITING PLAN**
**(SEPARATE HEADQUARTERS)**

**DATE: MARCH, 1997** | **FIGURE NO. 3.7**

**3.4.2.1 Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction).** This alternative locates the headquarters for the Engineer School (existing at FLW), Military Police School and Chemical School in Hoge Hall, Lincoln Hall and the new General Instruction Facility (GIF) complex. The BRAC land use plan for this alternative is illustrated on Figure 3.2. (Figures 3.2 through 3.7 have been located as a group following Table 3.3 of subsection 3.4) The light gray patterns on Figure 3.2 illustrate the existing approved (and previously evaluated) land use plan within the FLW cantonment area, while proposed changes are illustrated with darker patterns. Only the changes associated with the BRAC land use plan will be evaluated in this EIS. Figure 3.3 illustrates the general location of construction sites associated with this alternative. As discussed in the introduction to 3.4.2 above, Table 3.3 provides a cross reference that associates proposed training activities required to accomplish each of the training goals with a proposed site. Significant elements included in this concept include the following.

- Existing offices in Hoge and Lincoln halls will be reassigned to ensure maximum use of available space.
- Additional general and applied instruction classrooms, and general purpose administrative facilities will be constructed north of Lincoln Hall.
- The existing Engineer Center Museum, located in Walker Museum, will be modified and expanded to provide a consolidated museum facility for all three schools. The regimental room and some current Engineer Center Museum spaces will be renovated and additional storage areas constructed to house the additional collections.
- Unaccompanied enlisted barracks will be constructed north of Lincoln Hall.
- Applied instruction areas for the Chemical School will be constructed west of the 800-area.
- Applied instruction areas for the Military Police School will be constructed southwest of the 800-area.
- General purpose storage for the Chemical School and Military Police School will be obtained through the use of existing temporary World War II (WW II) era facilities.
- Unaccompanied officer personnel housing, if required, will be provided by converting existing, available Military Family housing into unaccompanied officer quarters, and by renovation of the existing Sturgis Heights quarters.
- General Officer Family Housing Quarters (GOQs) for the commandants of the Military Police School and Chemical School will be constructed along the northeast side of Piney Hills Drive. This site will place the new General Officer Family Housing Quarters across the street from the recently constructed General Officer Family Housing Quarters at FLW.

It is anticipated that this alternative facility development plan will provide the highest degree of collocation of similar facilities. It is also anticipated that this higher degree of collocation will provide the greatest long-term operations cost savings and the highest potential for synergistic (mutually supportive) training activities at FLW. Additionally, collocation allows the Army to focus on the doctrinal and force development requirements of the Engineers Corps, Military Police Corps, and Chemical Corps. The synergistic advantages of training and development programs are: coordination, employment and removal of obstacles; conduct of river crossing operations; operations in rear areas or along main supply routes; and counter-drug operations. The missions of the three branches will be more effectively integrated if training of the three Corps are collocated. The environmental impacts of this alternative, relative to the other two alternatives are described in Section 5, Environmental Consequences.

**3.4.2.2 Alternative 1 Land Use and Facility Plan (Combined Headquarters).** This alternative is based on the concept of collocating the headquarters for each of the three schools (existing Engineer School at FLW, and the Military Police School and Chemical School to be relocated). However, three separate "school houses" would be provided for general and applied instruction classrooms, thereby allowing the individual specialty branches to retain more autonomy. This alternative locates the headquarters for the Chemical School, Engineer School and Military Police School in Hoge and Lincoln halls. Figure 3.4 provides an illustration of the cantonment area land use plan for this alternative. Figure 3.5 provides an illustration of the proposed construction sites that would be used if this land use plan is implemented. Table 3.3 provides a cross reference that associates proposed training activities required to accomplish each of the training goals with a proposed site. Significant elements included in this concept include the following.

- The general instruction classroom requirements for all three service schools will be met through the reallocation of existing classrooms and the construction of new classrooms.

- Engineer Center base operations personnel currently located in Hoge and Lincoln halls (the Directorate of Resources Management, Directorate of Plans, Training and Mobilization (DPTM), etc) will be relocated to converted rolling-pin barracks in the 600-area.

- A new Initial Entry Training (IET) barracks will be constructed at the southern end of the 800-area (west of Iowa Avenue and south of South Dakota Avenue) to replace barracks converted into base operations administrative areas.

- The existing Engineer Center Museum, located in Walker Museum, will be modified and expanded to provide a consolidated museum facility for all three schools. The regimental room and some current Engineer Center Museum spaces will be renovated and an addition constructed to house the remainder of the additional collections.

- The 1000-area will be converted into Non-Commissioned Officers Academy (NCOA) general instruction and general purpose administrative areas for the three NCO academies.

- New 1 + 1 (private and semi-private) enlisted barracks will be constructed south of Specker Barracks to provide for flexible assignment of existing and new barracks as the training loads shift between the various service schools.

- Applied instruction areas for the Chemical School will be constructed southeast of the Directorate of Logistics (DOL) Transportation Maintenance complex.

- Applied instruction areas for the Military Police School will be constructed west of Alabama Avenue on the site of the 1200-area temporary buildings.

- A general purpose warehouse required to store training materials for the Chemical School and Military Police School near the existing warehouse district west of Louisiana Avenue and north of East Fourth Street.

- Unaccompanied officer personnel housing, if required, will be constructed near the existing Morelli Heights unaccompanied officer personnel housing, northeast of the Engineer School complex.

- General Officer Family Housing Quarters (GOQs) for the commandants of the Military Police School and Chemical School will be constructed along the northeast side of Piney Hills Drive. This site will place the new General Officer Family Housing Quarters across the street from the recently constructed General Officer Family Housing Quarters at FLW.

**3.4.2.3 Alternative 2 Land Use and Facility Plan (Separate Headquarters).** This alternative would locate the headquarters for Military Police School and the Chemical School in separate buildings, but with consolidated general instruction and library facilities in the 800-area. The Engineer School would remain in Hoge Hall, Lincoln Hall and Clarke Hall. Figure 3.6 illustrates the cantonment area BRAC land use plan for this alternative. Figure 3.7 provides an illustration of the proposed construction sites that would be used if this alternative is implemented. Table 3.3 provides a cross reference that associates proposed training activities required to accomplish each of the training goals with a proposed site. Significant elements included in this alternative are outlined below.

- Existing rolling-pin barracks in the 1000-area will be converted to house the Military Police Museum and Chemical Museum artifacts.
- The remaining 1000-area buildings will be converted into NCOA general instruction and general purpose administrative areas for the three NCO academies.
- Enlisted barracks will be constructed south of Specker Barracks to provide for flexible assignment of existing and new barracks as the training loads shift between the various service schools.
- Applied instruction areas for the Chemical School will be constructed northwest of the DOL Transportation Maintenance complex.
- Applied instruction areas for the Military Police School will be constructed southwest of the DOL Transportation Maintenance complex and south of the 800-area barracks.
- A general purpose warehouse required to store training materials for the Military Police School and Chemical School will be built in the 2300-area, replacing temporary facilities on that site.
- If required, unaccompanied officer personnel housing will be constructed near the existing 4100-area Officers' Quarters northeast of the Engineer Center Open Mess.
- General Officer Family Housing Quarters (GOQs) for the commandants of the Military Police School and Chemical School will be constructed along the northeast side of Piney Hills Drive. This site will place the new General Officer Family Housing Quarters across the street from the recently constructed General Officer Family Housing Quarters at FLW.

Additional information on each of these land use plans is located in Volume III, Appendix C.

**This completes the discussion of supporting facility alternatives which represent the second element of the planned BRAC action. Section 3.5 below provides a discussion of the third (and final) major element of the action, relocation of personnel required to support the planned relocation of the Military Police School and Chemical School to FLW.**

## 3.5 POPULATION RELOCATION ALTERNATIVES

Relocation of the training missions from FMC to FLW will involve the movement of the Military Police School and the Chemical School, along with a portion of the tenant and base support personnel that are currently located at FMC. As discussed in subsection 2.4.3, the proposed action will result in the relocation of approximately 1,599 military and 341 civilian permanent positions from FMC to FLW. In addition, the average daily student load at FLW will increase by approximately 3,295 military (including 2,130 trainees and 1,165 students) and 83 civilian students. These approximate numbers will be the same, regardless of the training and facility support alternatives (or combination of alternatives) that are ultimately selected for implementation.

The number of personnel can be expected to fluctuate as the number of students trained by the Army varies from year to year and due to continuing changes in the size and composition of the Army. These fluctuations will not cause any changes in the RCP, OPTM (Army's Proposed Action) or EPTM Alternatives analysis as the training goals remain the same and the number of students would be expected to decrease rather than increase. Furthermore, these minor population fluctuations will not require changes to the land use and facility plan alternatives which have been described above, and which are required to support the directed relocations.

The relocation of the Military Police School and Chemical School to FLW is mandated by BRAC Commission recommendations which were accepted by the President and Congress. Therefore, alternatives for this element are most logically associated with the timing of personnel movements since the Army needs to fully coordinate the transfer of people with the transfer of training missions and the availability of facilities required to support these personnel. Therefore, alternatives for relocating these personnel are based on timing issues. Alternatives considered for the relocation of personnel are described below.

### 3.5.1 No Action Alternative

The No Action Alternative for this element of the planned action would assess the impacts of implementing the mandated relocation of the Military Police School and Chemical School to FLW, without allowing relocation of the military and civilian personnel currently assigned to these schools. This would require the use of personnel currently assigned to FLW to perform the mission requirements associated with the Military Police School and Chemical School. Given the size, complexity and specialized expertise of the schools and missions to be relocated to FLW under the planned action, this alternative is not considered to be viable and will not be analyzed further in this EIS. However, the No Action Alternative does provide for a comparison of population conditions and related impacts at the current (pre-BRAC) level to those that are expected to occur under each of the BRAC action implementation scenarios.

### 3.5.2 Total Early Move Alternative

A "Total Early Move" Alternative would involve relocating all personnel and missions from FMC as soon as possible, prior to the completion of all receiving facilities at FLW. Moving of troops and equipment to FLW prior to the completion of required support facilities would require use of extreme measures to provide temporary accommodations. This action could shorten the time that these missions continue at FMC, and maximize savings to the Army associated with reduced operations at FMC. However, this action would severely compromise the ability of the Military Police School and Chemical School to accomplish their missions, and the quality of training and operations for units currently stationed at FLW as well as the units to be relocated from FMC. Furthermore, a Total Early Move would have a more abrupt affect on communities at both FLW and FMC because the transitions would occur over a shorter period of time. Given these factors, it was determined that this alternative is not viable nor reasonable. Therefore, no further consideration of the Total Early Move Alternative will be provided in this EIS.

### 3.5.3 Total Late Move Alternative

A "Total Late Move" Alternative would involve retention of all personnel and missions at FMC until all facilities required to support all relocated missions are available at FLW. This alternative would allow training operations to continue at FMC for the maximum amount of time. However, implementation of this alternative results in the following impacts:

- Delaying the initial property cleanup, disposal and reuse of lands at FMC; thereby resulting in increased economic impact on the community surrounding FMC.

- Delaying full operations at FLW will unnecessarily cause additional maintenance and operations expenses at FMC.

- Requiring the relocation of classes in session; thereby:
    - requiring students to move twice (once to FMC and then to FLW versus the Phased Move Alternative which would have classes in session at FMC continue until completed and the new class session start at FLW); thereby increasing personnel movement costs; and
    - result in interruption and disruption of classes in session prior to, during and immediately after their move reducing the amount of time available for instruction and lowering the level of skill proficiency that students would obtain during the affected classes.

- Requiring the maintenance of completed and available facilities at FLW until all facilities are completed and personnel relocated. These maintenance costs would be wasted since the facilities would be unoccupied.

- A more abrupt effect on communities at both FLW and FMC because the transitions would occur over a shorter time.

Given these factors, it was determined that although this alternative is feasible, it is not reasonable for the Army to implement this alternative because of increased operational costs, increased impacts on the civilian communities near FLW and FMC, and decreased training effectiveness. Therefore, no further consideration of the Total Late Move Alternative will be provided in this EIS.

### 3.5.4 Phased Move Alternative (Army's Proposed Action)

This alternative would involve the relocation of personnel (and related missions and equipment) on a phased schedule tied to the availability of facilities to support specific mission requirements. It is anticipated that the relocations will be performed between scheduled class iterations, that the two schools and the related support elements will move independently, and that sections of each school will be able to move as the facilities required to support that section become available. Impact analyses included in Section 5, Environmental Consequences, has been prepared based on the assumption that any implementation plan will be accomplished using a phased approach.

## 3.6 ALTERNATIVES NOT TO BE ADDRESSED IN DETAIL

### 3.6.1 Alternatives Excluded by BRAC Law

The 1990 Base Closure Act specifies that the requirement of the NEPA shall not apply to the following items:

- the **selection of the receiving installation** (in this case, FLW);

- the **need for closing or relocating** the military installation which has been recommended for closure or relocation by the Commission (FMC),

- the **need for transferring functions** to any military installation which has been selected as the receiving installation, or

- the **need for considering alternative Department of Defense properties** for receipt of transferred functions.

Consequently, alternatives that deal with these items have not been addressed in this document.

### 3.6.2 Relocate Training Mission Alternatives Excluded from Detailed Analysis

The EIS study team initially identified over 200 alternatives relating to the relocate training mission element of the proposed action (including 43 current practice methods, and 163 alternative methods). Volume IV of the EIS describes a three-phase screening process that was used to reduce this universe of possible alternatives to a range of reasonable alternatives to be fully evaluated in the EIS. This screening process documentation includes a summary of rationale for elimination of alternatives from further consideration. Furthermore, the No Action Alternative as it applies to this element of the BRAC action will not be evaluated in detail as discussed in subsection 3.3.1.

### 3.6.3 Support Facility Alternatives Excluded from Detailed Analysis

The rationale used to define BRAC land use plans and associated facility siting plans is described in Volume III, Appendix C. The discussion in Appendix C includes a discussion of alternative site concepts and locations that were omitted from further consideration. Furthermore, the No Action Alternative as it applies to this element of the BRAC action will not be evaluated in detail as discussed in subsection 3.4.1.

### 3.6.4 Population Relocation Alternatives Excluded from Detailed Analysis

As stated in subsection 3.5 above, the only viable alternative for relocating personnel from FMC to FLW is the "Phased Move Alternative". Therefore, the Total Early and Total Late alternatives for this element of the planned action will not be further evaluated. Furthermore, the No Action Alternative as it applies to this element of the BRAC action will not be evaluated in detail as discussed in subsection 3.5.1.

## 3.7 ARMY'S PREFERRED ALTERNATIVE

After consideration of the impact analysis documented in Section 5 of this EIS, the Army has identified a preferred alternative per guidance provided by the President's Council on Environmental Quality regulations (40 CFR 1502.14). The Army's Preferred Alternative for implementing the required relocation of the U.S. Military Police School and the U.S. Army Chemical School to FLW includes:

- implementation of the **Army's Proposed Action Optimum Training Method (OPTM) Alternative** to meet training mission goals and related support activities associated with the proposed action;

- implementation of the **Army's Proposed Land Use and Facility Plan Alternative (Combined Headquarters and Instruction)** which includes providing facilities (buildings, specialized training facilities and designated training land areas) to meet the training needs of the Military Police School and the Chemical School and related support personnel to be realigned to the installation, through a combination of:

    - reuse or additional use of existing facilities in their present condition;
    - alteration of existing facilities to make them suitable for new uses or activities;
    - construction of new facilities; and
    - rental or purchase of family housing in the local community by individual service members to meet part of the additional housing requirements resulting from the proposed action; and

- implementation of the **Army's Proposed Action Phased Move Alternative** which relates the timing of personnel movements to FLW to the planned availability of facilities and related scheduling considerations.

The rationale for selection of this combination of implementation alternatives is discussed in subsections ES.7 and 5.5.5. The specific elements included in the Army's Preferred Action are subject to change based upon additional analysis and incorporation of review comments obtained during the DEIS public review and comment period (as discussed in subsection 1.4.10) and at the DEIS public hearing (as discussed in subsection 1.4.11).

# Section 4
# AFFECTED ENVIRONMENT

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# Section 4: Affected Environment

## 4.1 INTRODUCTION

This section describes the existing environment at FLW to establish baseline conditions that can be used to evaluate anticipated impacts that could result from the proposed action. In some cases, the environmental area of influence has been extended beyond the existing boundaries of FLW. For example, the socioeconomic characteristics of the surrounding region have been included in this section since FLW operations have a considerable influence on the region.

Information will be presented in the following areas:

- Land Use and Training Areas;
- Air Quality and Climate;
- Noise and the Installation Compatible Use Zones (ICUZ);
- Water Resources including floodplains, surface water and groundwater;
- Geology and Soils;
- Infrastructure including utility and transportation systems;
- Hazardous and Toxic Materials;
- Munitions;
- Permits and Regulatory Authorization;
- Biological Resources including Federal Threatened and Endangered species, other protected species, aquatic and terrestrial resources and wetlands;
- Cultural Resources;
- Sociological Environment;
- Economic Development;
- Quality of Life; and
- Installation Agreements.

**Existing Environmental Programs**

Fort Leonard Wood has a proactive environmental management program which is managed by a full time staff of 17 employees. The FLW DPW Environment, Energy and Natural Resources Division is tasked with:

- development and implementation of programs designed to preserve, protect and restore the quality of the environment;
- coordination of National Environmental Policy Act (NEPA) compliance requirements;
- coordination of environmental compliance monitoring requirements (which are partially delineated in Volume III, Appendix H);

- liaison with Federal, state, local and Army environmental staffs to ensure the installation remains in compliance with applicable environmental requirements and standards, including: research and development; water resources management; air pollution abatement; hazardous materials management; noise abatement; oil and hazardous substance spill contingency planning, control and emergency response; environmental restoration; asbestos management; lead base paint abatement; radon reduction; and other environmental programs; and
- development and coordination of the forestry, land management and wildlife programs on the installation including conservation, management, and utilization of: soils, vegetation, croplands, rangelands, and forests; water resources; and fish and wildlife species through programs such as the Land Rehabilitation and Management (LRAM), a component of the Integrated Training Area Management (ITAM) Program.

Specific skills and areas of expertise held by the management staff include: air quality compliance; noise and the Installation Compatible Use Zone (ICUZ) program management; energy conservation and management; water resources management including floodplains, surface water and groundwater; geology and soils conservation; hazardous and toxic materials management and waste disposal; biological resources management including Federal T & E species, other protected species, aquatic and terrestrial resources and wetlands; cultural resources management including archaeological and historic properties; and NEPA compliance.

Other installation staff at FLW complement the skills possessed by the FLW DPW Environment, Energy and Natural Resources Division with skills in: land use management; infrastructure including utility and transportation systems; weapons use and safety; and munitions storage and disposal.

## 4.2 LAND USE

This section describes the installation setting and land use in terms of:

- Topographic and geographic setting and location, and
- Land and air space use within the installation and surrounding region.

### 4.2.1 Topographic Setting

Fort Leonard Wood is located in the Springfield-Salem Plateau section of the Ozark Plateau division of the Interior Highlands physiographic province. The FLW installation can be divided into two topographic regions known as the Low Plains and High Plains (GOM, 1982). The Low Plains area is characterized by the major stream valleys and a ridge which traverses the north-central to south-central portions of FLW. These areas have level to gently rolling, moderately dissected topography. Slopes are largely between 0 and 3 percent, but may reach 15 percent in moderately dissected stream valleys and the south-central region of the installation. Local relief is largely between 115 to 164 feet throughout the Low Plains with elevations ranging between 770 to 1164 feet above MSL.

The High Plains, consisting of gently to moderately rolling dissected surfaces, comprise approximately 80 percent of the reservation. Slopes are largely 8 to 15 percent, but can reach 45 percent and greater along bluffs and deeply incised tributaries. Steep, deeply dissected surfaces are prominent adjacent to alluvial stream valleys in the northeast and western portions of the installation. The landscape behind the river bluffs is dissected by small valleys or hollows occupied by tributaries of the major streams. Elevations in the High Plains range between 984 and 1263 feet above MSL, with local relief generally ranging between 180 to 262 feet.

The cantonment area in the north-central part of the reservation is located on level to gently rolling plains with slopes predominately from 0 to 3 percent. Slopes south of the cantonment area range from 3 to 8 percent where surfaces are moderately dissected. Local relief within this area averages 15 feet. The broad alluvial valleys of the Big Piney River and Roubidoux Creek are nearly level. Both river valleys are approximately ¼ to ½ mile wide. The river valleys contain extensive alluvial terrace systems as well as floodplain zones with meander scars.

### 4.2.2 Fort Leonard Wood Land Management Zones

Development across the installation is constrained by the physiographic features described above. Therefore, the installation has been divided into five distinct physiographic land management zones (PLMZs) to assist in facility planning. The PLMZs on FLW are summarized in Table 4.1 and are described in detail in the Integrated Natural Resources Management Plan (INRMP) (ESC, 1993).

**Table 4.1:**
**Physiographic Land Management Zones on Fort Leonard Wood**

| Zone | Description | Development Considerations |
|---|---|---|
| Riparian Bluffs and Waterway Corridors | Bottomland areas encompassing floodplains and low terraces. | Environmentally sensitive area. Soils cannot support vehicles in wet weather. |
| Forested River Hills | Steeply sloped forested hills and ridge tops and narrow forested stream bottomlands adjacent to riparian zones. | Area is characterized by dissected topography, steep slopes and stony soils. |
| Upland Forested Hills | Transitional zone between steep river hills and upland prairie areas. Encompasses most of the central portion of the installation. | Most areas are currently included within range impact areas which prohibits additional development. Erodible soils are also present. |
| Upland Rolling Hills and Savanna | Includes upland, relatively flat areas on the installation | Contains gentle slopes, good drainage and moderate depth to bedrock. Soil erosion is moderately high and perched water tables may be present. |
| Highly Developed Areas | Cantonment Area | Capable of supporting additional development. |

*Source: Integrated Natural Resources Management Plan 1993-1997 (ESC, 1993)*

### 4.2.3 Installation Land Use

**4.2.3.1 Existing Land Use.** FLW currently encompasses 62,911 acres of land located in the South Central Missouri Ozarks (Figure 2.1). The military reservation was established through the acquisition of at least 1,844 tracts of land by the U.S. War Department, totaling 71,239 acres, through fee title, leases, easements and permits. The majority of this acreage, 54,950 acres, was acquired in fee title. Through a series of subsequent land disposal transactions, including termination of leases, permits and easements, and land exchanges, the Army holdings at FLW have decreased and currently consist of approximately:

- 53,225 acres held in fee title,
- 14 acres that are leased or held in easements, and
- 9,672 acres of U.S. Department of Agriculture, Forest Service (USFS) lands that are located within the installation boundary and are used for military training according to FLW Regulation 210-14, Ranges and Training Areas through coordination with the Rolla-Houston Ranger District of the Mark Twain National Forest.

Of the above acreage, approximately 6,000 acres are classified as improved grounds. The remaining 56,911 acres are comprised primarily of training areas. Table 4.2 categorizes installation land use by type and acreage.

**Cantonment.** The cantonment area serves as the urbanized portion of the installation. Located in the northeastern portion of the reservation, the cantonment is flanked on all sides by training and open areas. As illustrated in Figure 4.1, the cantonment includes a wide variety of land uses which together comprise the elements necessary for a complete community. Family housing, with supportive elementary schools, is located in separate adjacent areas on both the northwest and southeast perimeters of the cantonment, while troop housing flanks the east, west and south sides of the large central core.

**Table 4.2:**
**Existing Land Use**

| Land Use Category | Approximate Acreage | Percent of Total Area |
|---|---|---|
| **Cantonment** | **6,000** | **9.5** |
| Troop Housing & Support | 739 | 1.2 |
| Family Housing | 1,394 | 2.2 |
| Unaccompanied Officers Quarters | 22 | * |
| Community/Commercial Services | 174 | 0.3 |
| Administration | 40 | * |
| Schools | 60 | 0.1 |
| Recreation | 171 | 0.3 |
| Hospital | 37 | * |
| Storage & Services (Industrial) | 238 | 0.4 |
| Vehicle Maintenance (Industrial) | 166 | 0.3 |
| Training | 2,537 | 4.0 |
| Parade Grounds | 33 | * |
| Ammunition Storage | 124 | 0.2 |
| Service (Utilities) | 44 | * |
| Forney Army Airfield | 221 | 0.4 |
| **Non-Cantonment** | **56,911** | **90.5** |
| Range/Impact Areas | 17,478 | 27.8 |
| General Training Areas | 2,730 | 4.3 |
| Bivouac Sites | 5,360 | 8.5 |
| Maneuver Areas | 28,276 | 45.0 |
| Recreation | 2,840 | 4.5 |
| Landfills | 227 | 0.4 |
| **Total Installation** | **62,911** | **100.0** |
| Note: * < 0.1 percent | | |
| *Source: Harland Bartholomew & Associates, Inc.* | | |

The core area consists of a variety of community and commercial services concentrated on the north and south perimeters of the centralized outdoor recreational area. Included in the above are the Post Exchange, Commissary, bank, Class VI stores, Non-Commissioned Officer's (NCO) Club and various indoor and outdoor recreational facilities. The General Leonard Wood Army Community Hospital occupies a prominent position between the northernmost community/commercial services node and the U.S. Army Engineer School to the north, which is the administrative center for the installation.

Industrial activities in the form of services, storage and vehicle maintenance are concentrated along the railroad spur in the northeastern corner, and form a transitional use area between the training areas to the east and the cantonment to the west. Forney Army Airfield (AAF), located between the cantonment to the north and range areas to the south, accommodates limited military and commercial air traffic, and is a transitional use on the southwest perimeter of the cantonment.



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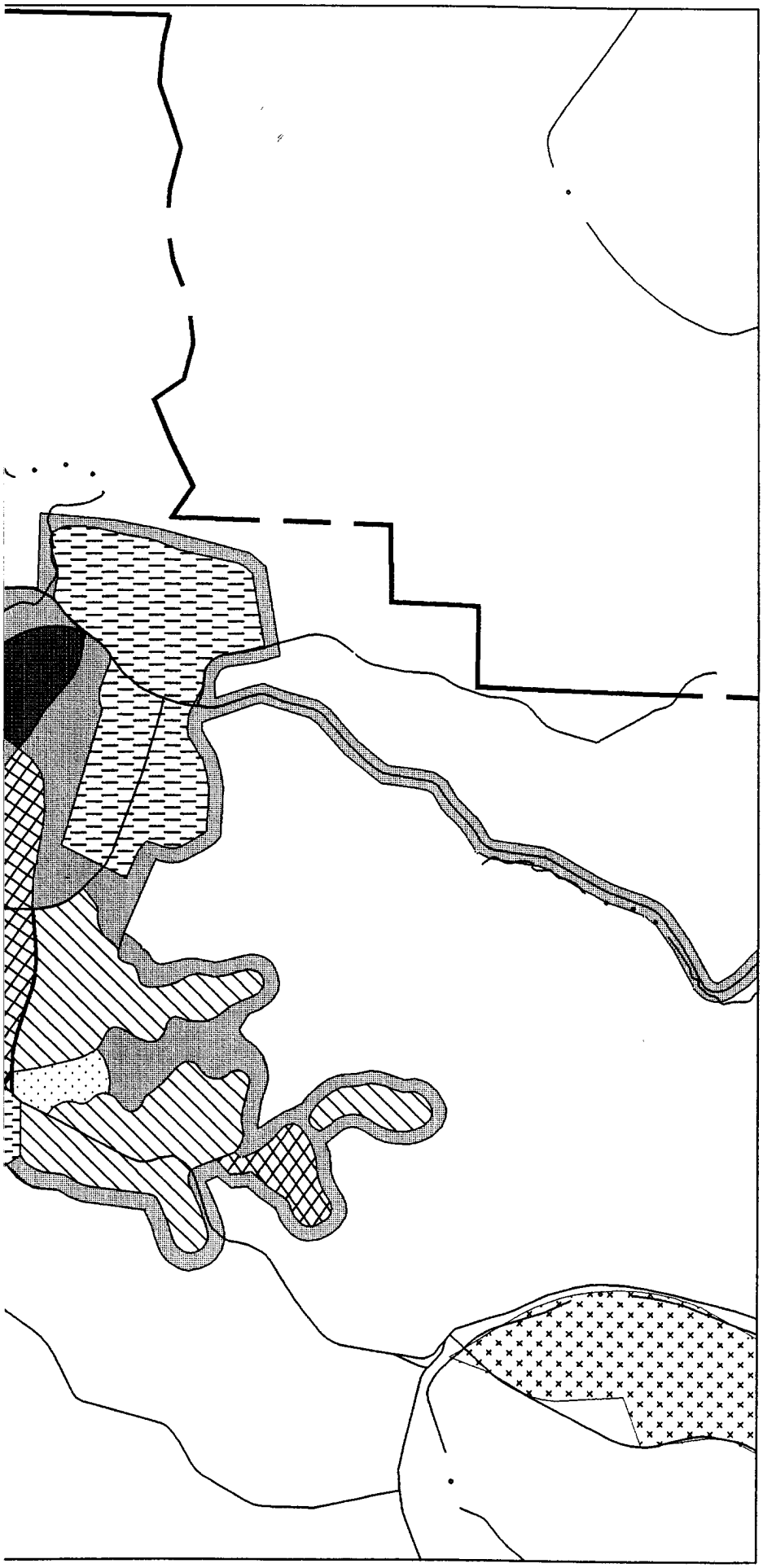
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## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- ADMINISTRATION/EDUCATION
- COMMUNITY FACILITIES
- FAMILY HOUSING
- INDUSTRIAL
- MEDICAL
- OPERATIONS
- TRAINING
- TROOP HOUSING
- RECREATION
- RESERVED / BUFFER

SOURCE MATERIAL:
HBA, 1991b
Master Plan for the USAEC and FLW

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Scale in Feet

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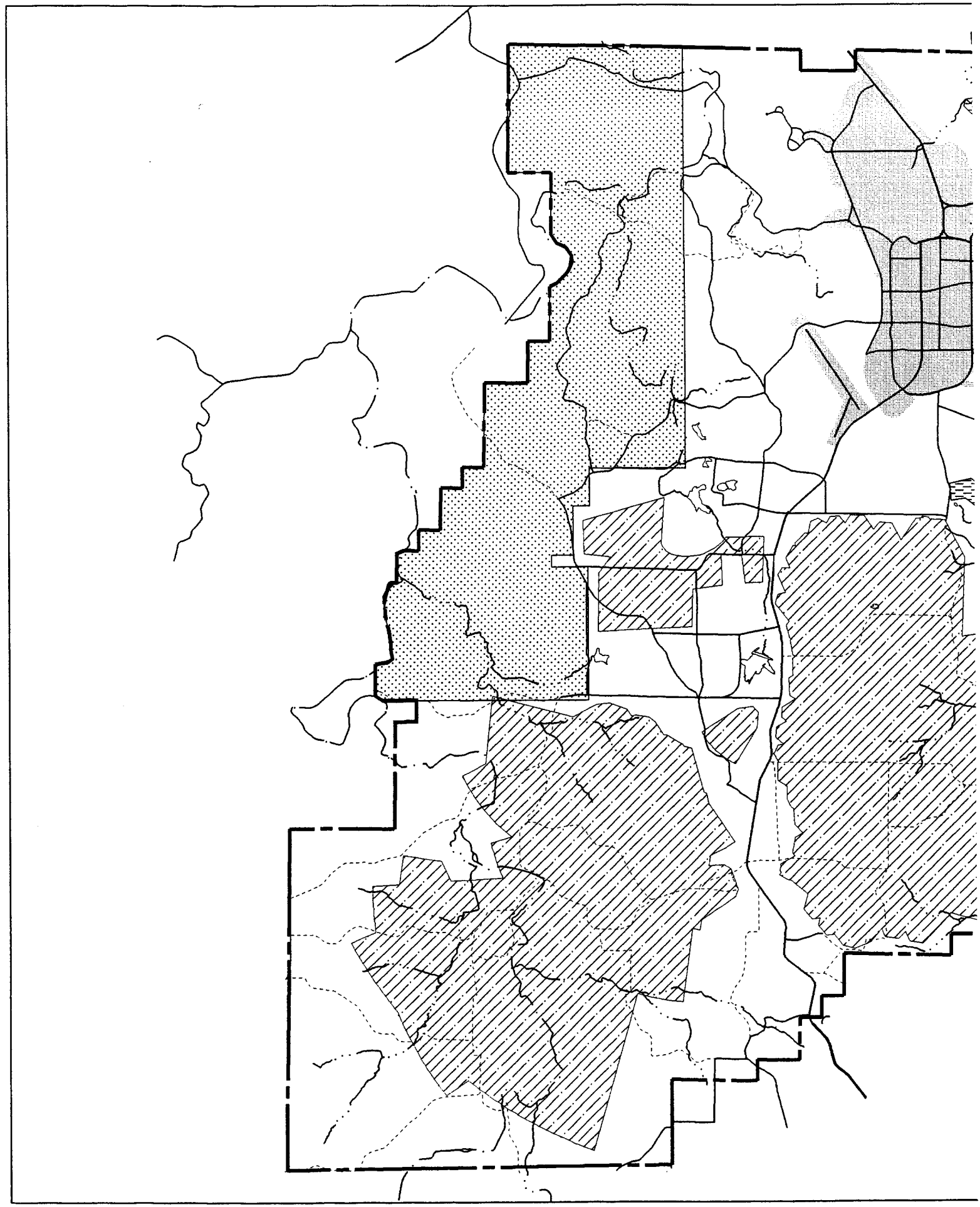
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ENVIRONMENTAL IMPACT STATEMENT

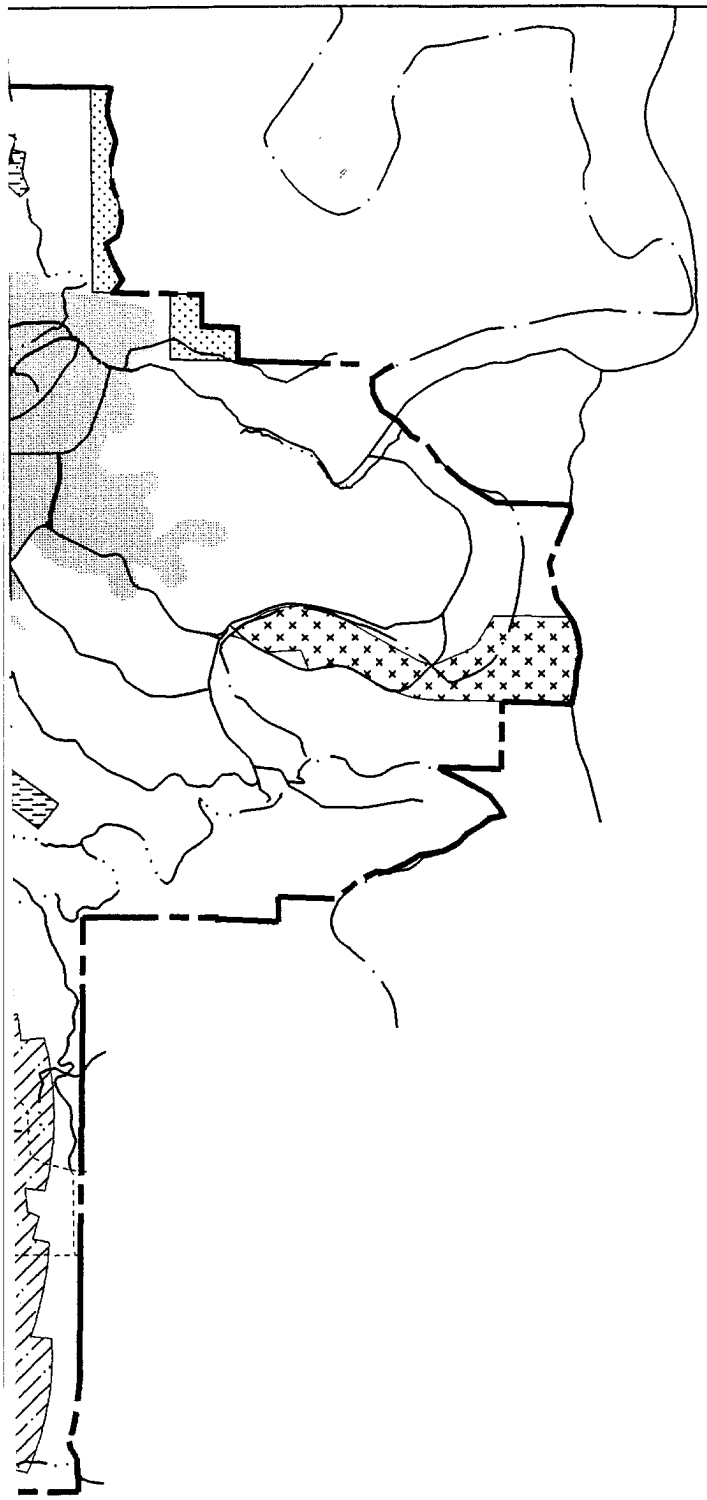
RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**EXISTING LAND USE CANTONMENT AREA**

**DATE: MARCH, 1997** | **FIGURE NO. 4.1**



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## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- CANTONMENT AREA
- INDUSTRIAL
- RECREATION
- TRAINING
- TRAINING-COORDINATED USE AREA
- RANGE IMPACT AREAS

SOURCE MATERIAL:

HBA, 1991b
Master Plan for the USAEC and FLW

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Scale in Miles

HARLAND BARTHOLOMEW & ASSOCIATES, INC
ST LOUIS, MISSOURI

KANSAS CITY DISTRICT
US ARMY CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**EXISTING LAND USE NON-CANTONMENT AREA**

**DATE: MARCH, 1997** | **FIGURE NO. 4.2**

**Non-Cantonment.** As indicated in Table 4.2 and illustrated on Figure 4.2, non-cantonment land uses consist of areas used for a variety of training activities and exercises, such as ranges, training areas, bivouac sites and maneuver areas which encompass approximately 53,844 acres, or approximately 85 percent of the land area of the installation. In addition, there are several Army-owned recreation areas within this non-cantonment land area.

- **Training Areas.** Training areas are located throughout the installation and consist of 90 individual sites varying in size from a few to several hundred acres. Some training areas are also used as bivouac sites. The majority of the designated training areas are located south of the cantonment area and collocated with the training ranges. There are also numerous training areas west of Forney AAF; east of the cantonment along the Big Piney River; and southeast of the cantonment. The training areas include a number of specialized facilities for engineer training. Among the largest and more significant are the Normandy Training Area (TA 244) which is a 900-acre area west of Forney AAF used for heavy engineer equipment operations and repair training; TA 256 which is an 80-acre area used for quarry/concrete/asphalt equipment operations training in the Big Piney River floodplain; and TA 190 which is a 600-acre area adjacent to the south of the cantonment used for motor transportation operations training. Additional training areas are provided for map reading, physical training, bivouacking and other activities consistent with initial entry training instruction. A 17 acre man-made lake used in conjunction with the float bridge training site (TA 250) provides units the capability to conduct boat operations and mobile assault bridge training.

- **Ranges.** Ranges comprise over 17,000 acres encompassing actual firing areas and attendant range fans/safety zones. The 33 existing ranges are limited to small arms, machine guns, recoilless rifles/light anti-armor weapons and demolition ranges. Associated with the ranges are 11 artillery and mortar firing points. The ranges are located primarily on either side of FLW Route 1 south of the cantonment area and fire into two discontinuous impact areas. Cannon Range, used by the U.S. Air National Guard for aerial bombardment training, is in the southwest corner of the west impact area.

- **Bivouac Sites.** Dedicated bivouac sites comprise over 26 individual areas and occupy over 5,000 acres in the non-cantonment area. In addition, approximately 20 training areas serve dual functions for training and bivouac operations. FLW has initiated a land rehabilitation program wherein bivouac sites are rotated every two-three years for environmental restoration and reclamation purposes.

- **Maneuver Areas.** Maneuver areas comprise the bulk of land not utilized for activities already described. Approximately 9,672 acres of Forest Service lands are included in the 28,276 acres used for maneuver areas. Forest Service lands are used in accordance with an existing use agreement with the U.S. Forest Service.

- **Recreation Areas.** Recreation areas are available for various open area sports throughout the installation, with the Big Piney River providing extensive river oriented recreational facilities. Located adjacent to the Big Piney River is an 18-hole golf course, the Happy Hollow Recreation Area, Stone Mill Spring Trout Management Area, Sportsmen's Club Campground, and numerous river access points and hiking trails. Hunting and fishing play an important part in the recreational activities of the installation. There are numerous ponds west of FLW Route 1 (Iowa Avenue) and north of the impact areas, with Bloodland Lake and Penn's Pond being the largest water areas on the installation. Other non-cantonment recreational facilities include a riding academy and horse stables, and trap, skeet and archery ranges.

**4.2.3.2 Land Use Plan.** The *FLW Master Plan* (FLW, 1991c) is intended to govern and guide the future physical development of the installation. This master plan reviewed three concept plans for future development of the installation and selected the "infill concept" as the preferred land use plan for the development for the installation.

The land use plan continues to reinforce the land use patterns that are based on the original 1940 design of the installation. This design proposed a large centrally located parade ground with troop housing arrayed along all four sides. To a remarkable degree, this pattern has been preserved during the intervening fifty years, even though most of the temporary barracks have been replaced with permanent structures. The land use plan integrates the original concept for the installation while meeting current requirements. The infill concept entails development by expansion and extension of existing concentrations of permanent facilities only to the extent necessary to accommodate new construction, as opposed to major relocations of existing functions.

### 4.2.4 Surrounding Area Land Use

**4.2.4.1 Existing Land Use.** Extensive Mark Twain National Forest lands (Rolla-Houston Unit) are located east, west and south of FLW boundaries (Figure 2.2) In addition, there are numerous private land holdings within the Mark Twain National Forest and adjacent to the FLW boundary. Timber management and recreational activities are the primary uses occurring within the boundaries of the National Forest. Private holdings adjacent to the installation are devoted primarily to agricultural uses, principally grazing. Urbanized development is located north of the installation, along Business Spur Interstate 44 (I-44) and in the cities of St. Robert and Waynesville, Missouri, primarily characterized by strip commercial development. However, the majority of the area between the installation and the developed portion of St. Robert consists of land used for agriculture and forest management.

None of the National Forest land is zoned, as Federal government-owned land is exempt from zoning. In addition, the surrounding unincorporated areas are not zoned as Pulaski County does not have a zoning ordinance. The City of St. Robert, which borders a substantial portion of the installation on the north, implemented zoning in the early 1980s. As a result, the majority of the commercially developed area along Business Spur I-44 is zoned "C-2" Commercial. Other developed areas east and west of Business Spur I-44 are respectively zoned "B-2" Residential and "B-3" Residential. Undeveloped areas are zoned predominantly "A" Agricultural and are used for forestry/timber purposes.

**4.2.4.2 Future Land Use Plans.** Pulaski County has no comprehensive plan in effect to guide growth and development in the county. In 1980, the *Waynesville-St. Robert Comprehensive Plan: 1980-2000* (Nessing, 1980) was jointly funded and sponsored by these two cities. The plan demonstrated the dominance of FLW on the local economy, and recognized that sufficient housing of a desirable quality and price did not exist in St. Robert and Waynesville to attract a reasonable proportion of FLW off-post military personnel. The plan proposed that the majority of the undeveloped land between the southern boundary of St. Robert and FLW be developed as low density residential (less than four dwelling units per acre). Greater coordination between the two cities and FLW with respect to economic, social and physical development and improvement was also included among the goals of the plan.

As a result of the adoption of the above plan, the City of St. Robert enacted zoning and subdivision ordinances as mechanisms for guiding and controlling future growth. Recent activities by the city adjacent to the installation include the annexation of the remaining unincorporated land along both sides of Business Spur I-44 to the north of the north main (Sverdrup) gate to the southern boundary of the city. Construction of new sanitary sewer and water main lines paralleling the business spur in the above annexed area have been completed to accommodate future development.

### 4.2.5 Intergovernmental Cooperation and Joint Planning

A cooperative and harmonious relationship exists between Waynesville, St. Robert and FLW. The City of Waynesville and FLW are in the planning stage of developing Forney Army Airfield as a joint use facility which will serve both the military needs of the installation and the commercial needs of the local community, with the promotion of business growth a primary goal.

FLW's good relationship with the cities of Waynesville and St. Robert is due in part to the efforts of the "Friends Concerned for the Future of FLW" committee which consists of several organizations and individuals, including the "Committee of Fifty" and the Waynesville-St. Robert Chamber of Commerce. The purpose of this group is to promote a harmonious relationship between FLW and the local business community. This group recently sponsored and partially funded *An Analysis of the Impact of Basic Training at FLW on the Waynesville-St. Robert Economy* (MRI, 1993) in response to the possibility of the elimination of basic training activities at the installation. A primary local concern is the potential for reduction or elimination of missions at FLW as a result of future BRAC actions. In this regard, the committee's primary goal is the expansion of the economic base of the area to include more industrial development in order to achieve a more diversified economy, which will stabilize the fluctuating character of the military oriented economy of the region.

Pulaski County and the cities of Crocker, Dixon, Richland, Waynesville and St. Robert have formed an intergovernmental organization called the "Regional Commerce and Growth Association." The association, under the aegis of the State of Missouri, applied for and was granted planning assistance funds from the Office of Economic Adjustment to develop a growth management plan and implementation program aimed at accomplishing the following:

- Developing a consistent set of planning and development policies, and zoning and building code regulations to be applied equally to the cities and areas of Pulaski County surrounding FLW. This is an effort to create a level playing field and address the lack of land use controls in the unincorporated areas of some counties surrounding Fort Leonard Wood.

- Work with home builders to stimulate the construction of affordable single and multi-family units to accommodate the arriving soldiers and dependents who choose to live off-post.

- Work with Federal, state and local agencies to coordinate expansion/augmentation of public streets, water and sewerage systems serving the areas surrounding FLW; improve schools, commercial services, quality of life programs, and job opportunities for residents and arriving dependents.

The growth management program will be jointly funded by the Office of Economic Adjustment, State of Missouri, Pulaski County, and the participating cities. The duration of the study will be approximately 8 months beginning in September 1996 with implementation of the study recommendations planned to commence in April 1997.

### 4.2.6 Air Space Use

Due to the hazards created by artillery, mortars and missiles, the Federal Aviation Administration (FAA) air traffic controllers prohibit civilian aircraft from entering areas where and when military range activity is in progress. Military aircraft can enter the restricted area when firing is in progress, but only under controlled conditions. In coordination with FLW, the FAA has established eight restricted areas and two Military Operations Areas that establish restrictions for military and non-military aircraft operations near FLW. Information concerning civilian and commercial aircraft use of Forney Army Airfield is located in subsection 4.7.3.3 below.

## 4.3 AIR QUALITY

This section provides a description of the current air quality conditions at the installation. The primary Federal law is the Clean Air Act (CAA), which is aimed at maintaining and improving ambient air quality. The CAA Amendments of 1990 (CAAA) included several new approaches to improving air quality, such as tradeable emission allowances and technology based control standards. The amendments defined air pollutant nonattainment areas and control requirements, expanded the list of Hazardous Air Pollutants (HAPs) to the current list of 188 pollutants and introduced technology based control standards, established a new federal operating permit program, and addressed mobile source emissions, acid rain, and stratospheric ozone protection. Besides these complex Federal rules, FLW also must comply with the Missouri Department of Natural Resources (MDNR) Code of State Regulations (CSR) which are contained in Title 10, Division of Air Conservation Commission. The MDNR administers the CAA on behalf of USEPA through the implementation of Title 10. FLW has had an air quality management program for over 15 years and has implemented the required programs to maintain compliance with all Federal, state and local regulations.

### 4.3.1 Emissions Sources

The most recent source identification and emissions summary at FLW was performed through a comprehensive air emissions inventory for stationary sources during mid-April 1993, with the baseline year being 1992 (ETC, 1993a). The inventory portion of the project identified air emission sources, gathered information pertaining to material consumption and process operations, interviewed installation personnel, and obtained pertinent information for calculation of air pollution emissions. Source-specific emissions were derived from field data involving a variety of methodologies including emission factors, mass balance calculations and computer models. A mobile source air emissions inventory has not been conducted.

**4.3.1.1 Type of Sources.** The 1993 inventory only addressed stationary sources (not mobile) and did not include chlorofluorocarbons (CFCs) or halons. The inventory addressed the following sources that were subsequently quantified for emission rates:

| | |
|---|---|
| Boilers | Incinerators |
| Small Combustion Engines (Generators, Pumps etc.) | Miscellaneous Heating |
| Fuel Storage/Dispensing | Painting Operations |
| Degreasing Operations | Woodworking Operations |
| Welding Operations | Printing Operations |
| Sterilizer Operations | Laundry Operations |
| Wastewater Treatment | Pesticides/Herbicides Operations |
| Quarry Operations | Landfill Operations |
| Firefighting Training | Prescribed Burns/Wildfires |
| Fugitive VOCs & HAPs | Dirt/Unimproved Roads |

Mobile air pollution sources include Privately Owned Vehicles (POVs), Government Owned Vehicles (GOVs), aircraft flight operations and helicopter flight operations. Government owned vehicles include trucks, tractors, cranes, forklifts, and a variety of other vehicles and equipment. Aircraft operations are comprised of primarily helicopters, tactical aircraft, and medical aircraft. The air emissions from mobile sources have not been estimated in prior emissions inventories because these sources are generally not regulated, nor are they part of any permitting requirements.

FLW developed a CFC management plan in September, 1992. This plan documents the use of ozone depleting chemicals at the installation and identifies replacements to eliminate CFC usage. The majority of CFCs are used for air conditioning units, food refrigeration units and fire suppression units. As part of the replacement plan, all but one of the major air conditioning units' refrigerants have been replaced with R-134a, a HFC and approved substitute under the EPA Significant New Alternatives Policy (SNAP) program. The food refrigeration units currently have an unknown replacement date for the CFC

refrigerant R502. The installation employs the proper CFC recovery units for air conditioning units and the technicians have been properly certified in the operation. The halon will be replaced in each individual fire suppression system with suitable substitutes as they become available.

**4.3.1.2 Emissions Inventories.** As part of compliance with current air quality regulations, FLW is required to submit an annual Emission Inventory Questionnaire (EIQ) to the MDNR. The 1995 EIQ (FLW, 1996k) identified ninety-nine emission points. HAPs are omitted because the EIQ indicates negligible emissions on a source by source basis. Estimated air emissions from FLW operations (sorted by source type) based on the 1995 EIQ are shown on Table 4.3.

**Table 4.3:**
**Estimated Air Emissions From Operations at Fort Leonard Wood**

| Source Type | PM10 | SOx | NOx | VOC | CO | Lead |
|---|---|---|---|---|---|---|
| Asphalt | 0.04 | 0.19 | 0.03 | 0.00 | 0.00 | 0.00 |
| Boiler | 0.63 | 29.01 | 19.19 | 0.36 | 4.71 | 0.00 |
| Degreasing | 0.00 | 0.00 | 0.00 | 2.37 | 0.00 | 0.00 |
| Fuel Storage | 0.00 | 0.00 | 0.00 | 11.56 | 0.00 | 0.00 |
| Generator | 0.10 | 0.09 | 1.38 | 9.93 | 0.30 | 0.00 |
| Incinerator | 0.05 | 0.00 | 0.03 | 0.09 | 0.00 | 0.00 |
| Miscellaneous | 0.16 | 0.00 | 0.00 | 55.43 | 0.00 | 0.00 |
| Paint Booth | 0.00 | 0.00 | 0.00 | 10.13 | 0.00 | 0.00 |
| Pesticide/Herbicide | 0.00 | 0.00 | 0.00 | 0.74 | 0.00 | 0.00 |
| Quarry | 8.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Space Heating | 2.51 | 0.00 | 33.88 | 1.22 | 6.45 | 0.00 |
| Sterilizer | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 |
| Wastewater Treatment | 0.00 | 0.00 | 0.00 | 2.76 | 0.00 | 0.00 |
| Woodworking | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Emissions (tons per year) | 12.47 | 29.29 | 54.51 | 94.84 | 11.46 | 0.00 |

*Source: 1995 EIQ (FLW, 1996K)*

### 4.3.2 Regulatory Compliance

**4.3.2.1 Air Quality Standards.** FLW is under the jurisdiction of U.S. Environmental Protection Agency (USEPA) Region VII and the MDNR. The MDNR conducts annual compliance audits at FLW. In addition, the Army has established the Environmental Compliance Assessment System (ECAS) which requires that periodic audits be conducted to determine compliance of ongoing missions and programs with Federal, state and local environmental laws and regulations. Based on the combination of these audit mechanisms, the installation has implemented the required programs to maintain compliance with all Federal, state and local air regulations.

Under the authority of the CAA and resultant regulations (40 Code of Federal Regulations (CFR) Part 81), the USEPA has divided the country into geographical regions known as Air Quality Control Regions (AQCRs) to evaluate compliance with the National Ambient Air Quality Standards (NAAQS). There are NAAQS for each of the six criteria pollutants (carbon monoxide, nitrogen dioxide, ozone, sulfur oxides, PM-10, and lead). Criteria pollutants are those which EPA has placed the greatest emphasis and has developed health-based concentrations for ambient air. There are primary NAAQS for protection of public health and secondary NAAQS for the protection of public welfare (effects on soils, vegetation, climate, economic value, personal comfort and welfare). Table 4.4 shows both the primary and secondary NAAQS and the Missouri ambient air quality standards. Missouri is divided into AQCRs by county. FLW is primarily located in Pulaski County with portions in Texas and Laclede counties. The FLW area is currently in attainment with these standards according to Missouri regulations (10 CSR 10-6.020 (2)(N)(5))

which state that the nonattainment areas for Missouri do not include the counties of Pulaski, Texas, and Laclede.

**4.3.2.2 Air Monitoring Programs.** At the time of the BRAC decision, the installation was not required to perform any ambient air quality monitoring or source testing on a routine basis other than at the rock crushing plant. New permit requirements, established in permits already obtained to support BRAC actions, are provided in subsection 5.2.2.10. The rock crushing plant (permit number 0995-017) has multiple requirements for testing between 60 and 180 days after initial startup to ensure a given opacity limitation for a specified piece of equipment within the facility is met. It also requires ongoing overall visual inspections using USEPA Method 9, to ensure compliance with a 20 percent opacity limitation. In addition, New Source Performance Standards apply to the asphalt plant. Certification testing is required and includes total suspended particulate and opacity.

**Table 4.4:**
**National and Missouri Ambient Air Quality Standards**

| Air Pollutant | EPA Standard | Concentration | Remarks | AQCR Classification |
|---|---|---|---|---|
| Particulate Matter ≤ 10 microns ($PM_{10}$) | Primary and Secondary Standard | 50 micrograms per cubic meter | Annual arithmetic mean. The standard is attained when the expected annual arithmetic mean is less than or equal to 50 micrograms per cubic meter. | Attainment |
| | Primary and Secondary Standard | 150 micrograms per cubic meter | 24-hour average concentration. The standard is attained when the expected number of days per calendar year with a 24-hour average above 150 micrograms per cubic meter is equal to or less than one. | Attainment |
| Sulfur Dioxide | Primary Standard | 80 micrograms per cubic meter (0.03 ppm) | Annual arithmetic mean | Attainment |
| | Primary Standard | 365 micrograms per cubic meter (0.14 ppm) | Maximum 24-hour concentration not to be exceeded more than once per year | Attainment |
| | Secondary Standard | 1,300 micrograms per cubic meter (0.5 ppm) | Maximum 3-hour concentration not to be exceeded more than once per year | Attainment |
| Carbon Monoxide | Primary Standard | 10 milligrams per cubic meter (9 ppm) | 8-hour average not to be exceeded more than once per year | Attainment |
| | Primary Standard | 40 milligrams per cubic meter (35 ppm) | 1-hour average not to be exceeded more than once per year | Attainment |
| Ozone | Primary and Secondary Standard | 235 micrograms per cubic meter (0.12 ppm) | The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1 | Attainment |
| Nitrogen Dioxide | Primary and Secondary Standard | 100 micrograms per cubic meter (0.053 ppm) | Annual arithmetic mean not to be exceeded | Attainment |
| Hydrogen Sulfide (Missouri AAQS) | NA | 70 micrograms per cubic meter (0.05 ppm) | 1/2-hour average not to be exceeded over 2 times per year | Attainment |
| | NA | 42 micrograms per cubic meter (0.03 ppm) | 1/2-hour average not to be exceeded over 2 times in any 5 consecutive days | Attainment |
| Sulfuric Acid (Missouri AAQS) | NA | 10 micrograms per cubic meter | 24-hour average not to be exceeded more than once in any 90 consecutive days | Attainment |
| | NA | 30 micrograms per cubic meter | 1-hour average not to be exceeded more than once in any 2 consecutive days | Attainment |
| Lead | Primary and Secondary Standard | 1.5 micrograms per cubic meter | Maximum arithmetic mean averaged over a calendar quarter | Attainment |

*Notes: NA- Not Applicable*

*Sources: 40 CFR 50, Missouri 10 CSR 10-6.010*

Source testing was required for the hospital incinerator (permit number 0590-004) 60 days after permit issuance. The testing was conducted for particulate matter, carbon monoxide and hydrogen chloride on the incinerator exhaust gas, and the incinerator met the permit requirements.

### 4.3.3 Climate

FLW is located within a humid, continental climatic area. FLW is in the path of cold air moving from Canada; warm, moist air moving from the Gulf of Mexico; and dry air from the west and southwest. While winters are cold and summers are hot, prolonged periods of very cold or very hot weather are unusual.

Precipitation, in the form of rain showers and thunderstorms, occurs from March through November. Snowfall typically occurs from November through March and averages 15 to 20 inches per year in Missouri. The snow usually melts within one or two weeks of falling. The monthly wind frequency distribution for Springfield, Missouri shows the prevailing wind direction to be from the south. The data were compiled from 49,427 daily observations.

The average length of the growing season is approximately 210 days, which falls between the latest occurrence of freezing temperatures in early April and the earliest occurrence of freezing temperatures in late October. July and January are the months which typically have the temperature extremes for the year. The average July maximum and minimum temperatures are 90 degrees and 65 degrees Fahrenheit (F), respectively. The average January maximum and minimum temperatures are 46 and 18 degrees F, respectively. Area climatological data are presented in Table 4.5.

**Table 4.5:**
**Climatological Data**

| | Normal Mean Temp (degrees Fahrenheit (F)) | | | | | Normal Precipitation (inches) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| City | Dec-Feb | Mar-May | Jun-Aug | Sep-Nov | Year | Dec-Feb | Mar-May | Jun-Aug | Sep-Nov | Year |
| Licking | 32.3 | 54.0 | 74.9 | 56.1 | 54.4 | 6.4 | 11.6 | 12.0 | 8.3 | 38.3 |
| Waynesville | 35.3 | 55.7 | 75.0 | 57.4 | 55.9 | 7.0 | 12.1 | 11.0 | 9.8 | 39.9 |
| Lebanon | 34.9 | 55.8 | 76.1 | 58.1 | 56.3 | 6.2 | 11.8 | 10.9 | 10.3 | 39.2 |

*Source: Harland Bartholomew & Associates, Inc.*

### 4.3.4 Odors

Odors are regulated by 10 CSR 10-3.090 which restricts excessive odorous matter for specified concentrations, durations, and frequencies. There are no widespread persistent and unique discernable odors on-post nor within the immediate off-post environs of the FLW installation other than those typically associated with certain operations characteristic of military installations. Periodic odors are associated with the sewage treatment plant, located in the northeast portion of the cantonment, and with the on-post fueling areas.

## 4.4 NOISE AND THE INSTALLATION COMPATIBLE USE ZONES (ICUZ)

Previous studies of noise generation and noise impacts conducted at FLW (USAEHA, 1983) noted that the primary noise generators include explosion of land mines, demolition of ammunition, firing on the small arms ranges, the grenade ranges and the aircraft noise associated with Forney AAF and Cannon Range. Secondary noise generators were identified as blasting at the quarry, heavy equipment operations on TA 244, vehicular traffic, artillery fire by the reserve components and stationary sources such as electric generators and air conditioners.

FLW has recently prepared an ICUZ study which reflects 1992 operating conditions and associated noise levels (FLW, 1994d). This study utilizes noise contours developed by the USAEHA to determine any areas on- and off-post which experience high levels of noise. Further, the ICUZ study is intended to assure compatible development and use of land adjacent to the FLW reservation boundary.

### 4.4.1 Land Use Compatibility

Due to the number and variety of activities which occur on its installations, the Army has devoted an extensive effort to the development of a framework for addressing and resolving land use compatibility questions and issues. Within this framework, the Army seeks assurance that all reasonable, economical and feasible measures have been taken to minimize unfavorable impacts upon the quality of the environment consistent with its national defense responsibilities.

### 4.4.2 Land Use Guidelines

The ICUZ program has been developed in an effort to protect local citizens from the noise and accident hazards associated with military activities in the interests of their health, safety and general welfare; and to prevent degradation of mission capability due to encroachment. The Army has developed land use guidelines for areas on and near its installations as an element of the ICUZ program. These guidelines have not been developed to prevent building in these areas, but rather to recommend land uses compatible with activities performed on the installation. These guidelines are included in Appendix D in the ICUZ study (FLW, 1994d). The Army study also recommends that the Army continue to work closely with the cities of Waynesville and St. Robert and Pulaski County. In this way, local officials can implement land use controls along the north installation boundary consistent with the Installation Compatible Use Zones to ensure long-term training capabilities.

### 4.4.3 Noise Zones

Noise Zones are classified into three levels for certain types of land use. Figure 4.3 illustrates the noise contour lines of Zones II and III.

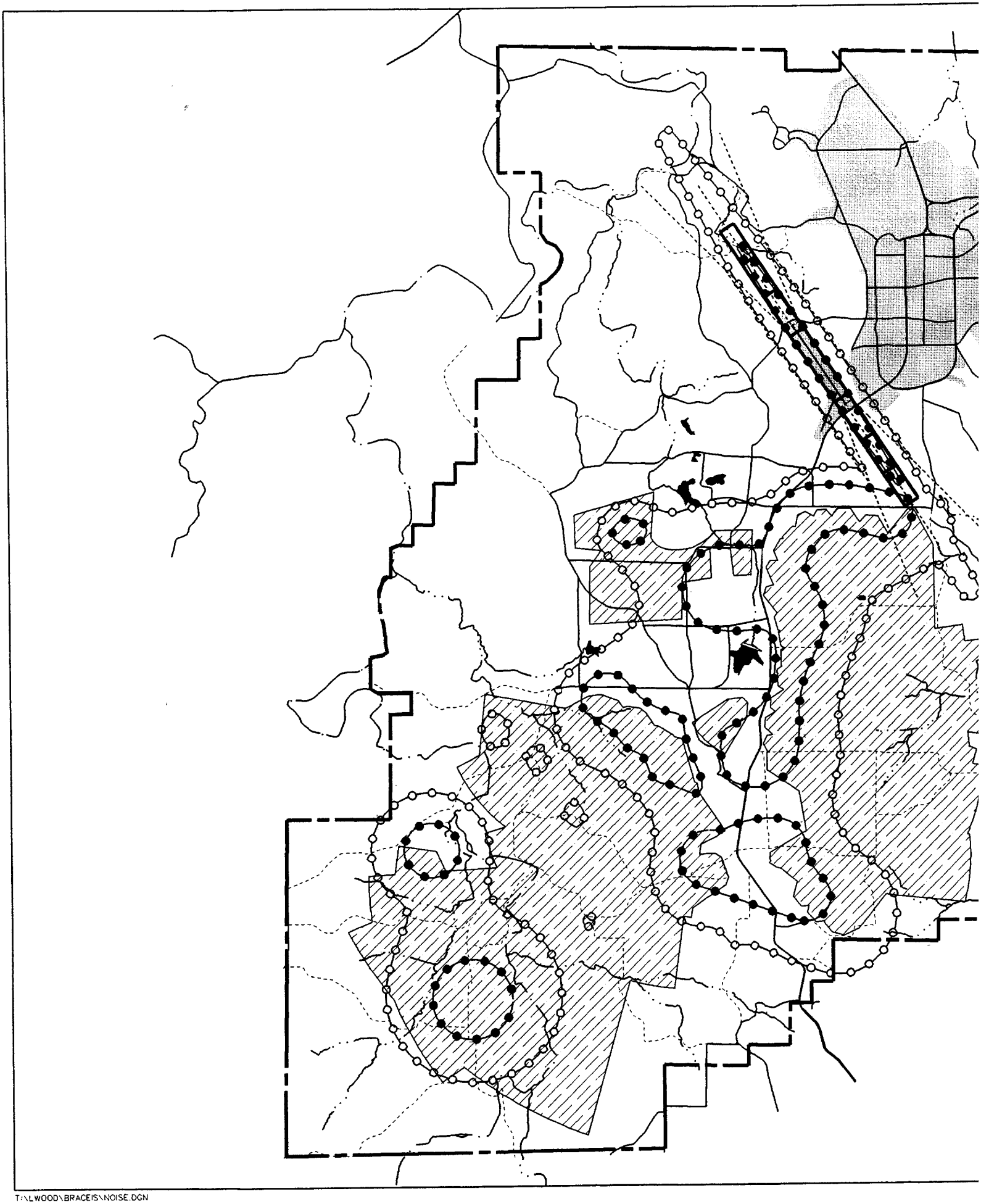
- Zone I is the area where the day-night sound level (DNL) is less than 65 decibels, A-weighted scale (dBA). This area, considered to have moderate to minimal noise exposure, is acceptable for noise-sensitive land uses including housing, schools and medical facilities.

- Zone II is the area where the sound level is between 65 and 75 dBA DNL. This area is considered to have a significant noise exposure and is, therefore, normally unacceptable for noise-sensitive land uses. No Zone II noise contours enter the cantonment. Zone II boundaries generated by aircraft operations are contained entirely within the FLW boundary. Noise Zone II contour lines generated by range operations extend beyond the installation boundary in only two places: approximately 133 acres in unincorporated Pulaski County on the southeast boundary of the installation; and approximately 5 acres adjacent to the southwest quadrant of the installation, north of the Cannon Range.

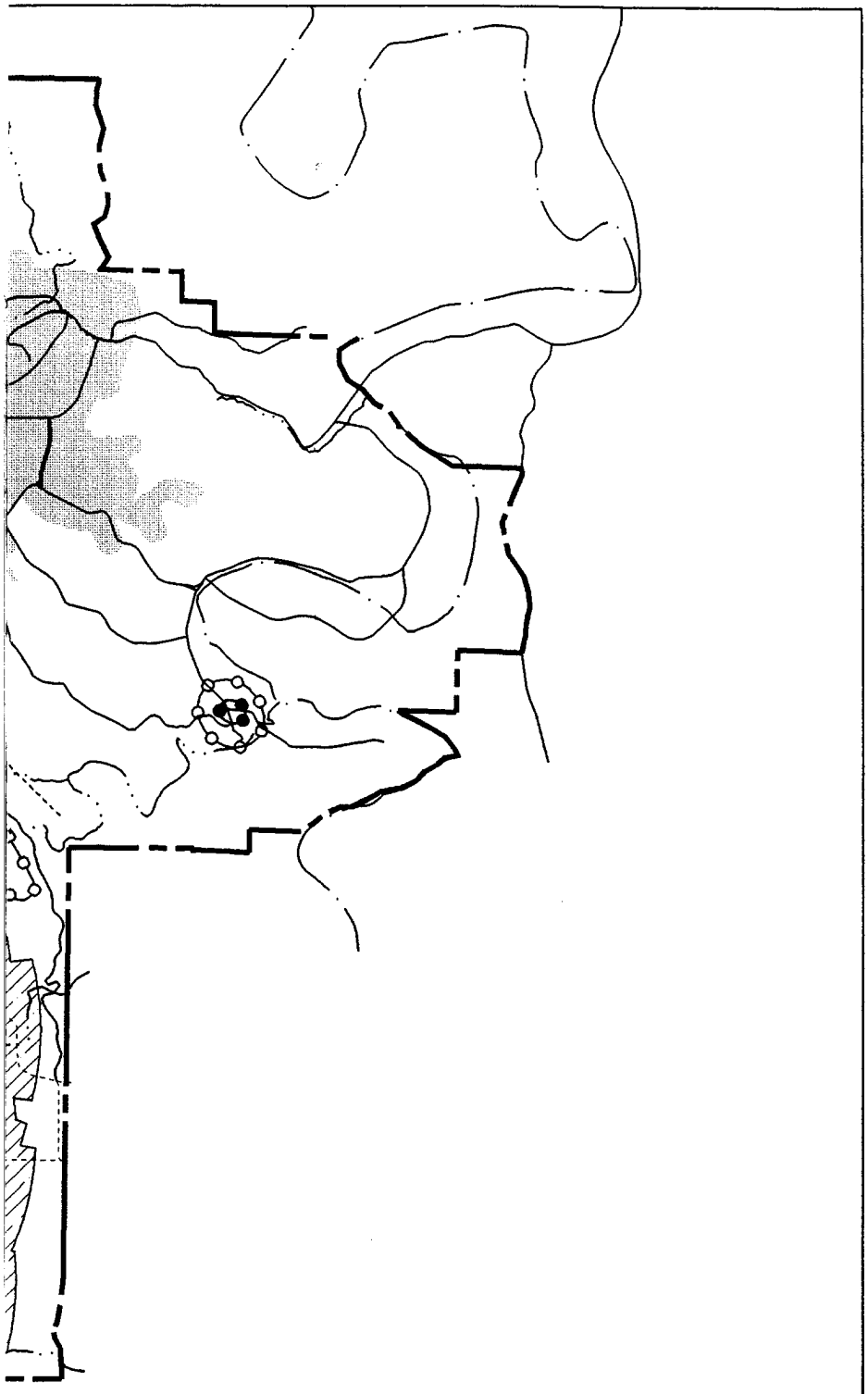
  The area in unincorporated Pulaski County is located on the southeastern boundary of the installation, and on the north side of Missouri Route TT, northeast of its intersection with Missouri Route AW. The area near Cannon Range is located in the Mark Twain National Forest. No sensitive land uses exist in either of the areas.

- Zone III is the area where the DNL is greater than 75 dBA. This zone is considered an area of severe noise exposure and is unacceptable for noise-sensitive activities. All Noise Zone III areas generated by range and aircraft operations are contained within the installation boundaries and are primarily located near TA 256, within Cannon Range, and the training range impact areas.

When significant changes occur in the type, frequency or size of range operations, new noise contour models are prepared and the results are appended to the ICUZ study or a new ICUZ study is prepared.



T:\LWOOD\BRACEIS\NOISE.DGN



## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- CANTONMENT AREA
- AIRFIELD SAFTEY ZONE
- RANGE IMPACT AREAS
- NOISE CONTOURS-ZONE II
- NOISE CONTOURS-ZONE III
- IMPOUNDMENT

Source:

Installation Compatible Use Zone Study (FLW, 1994d).

N

0 1 2 3

Scale in Miles

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

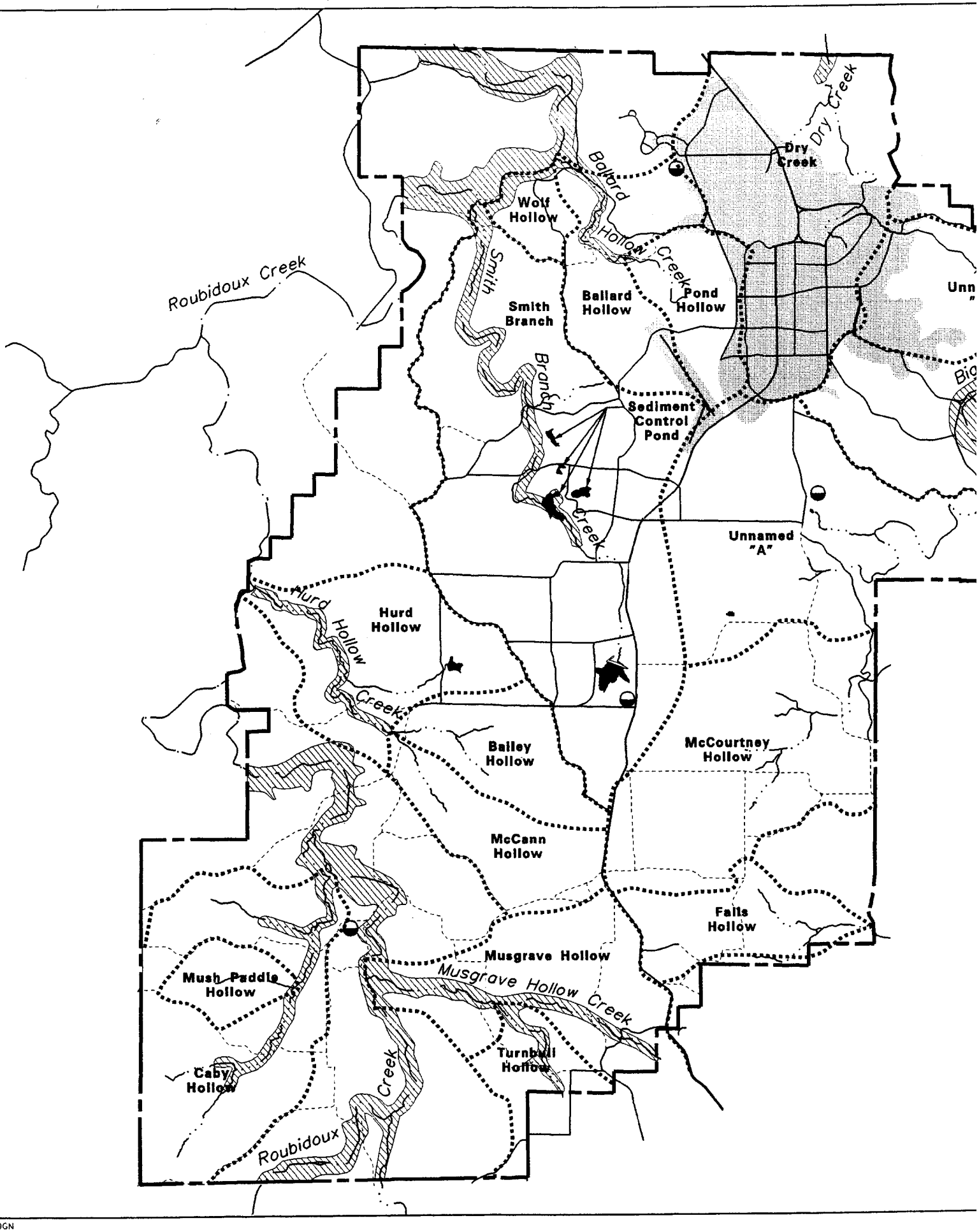
KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

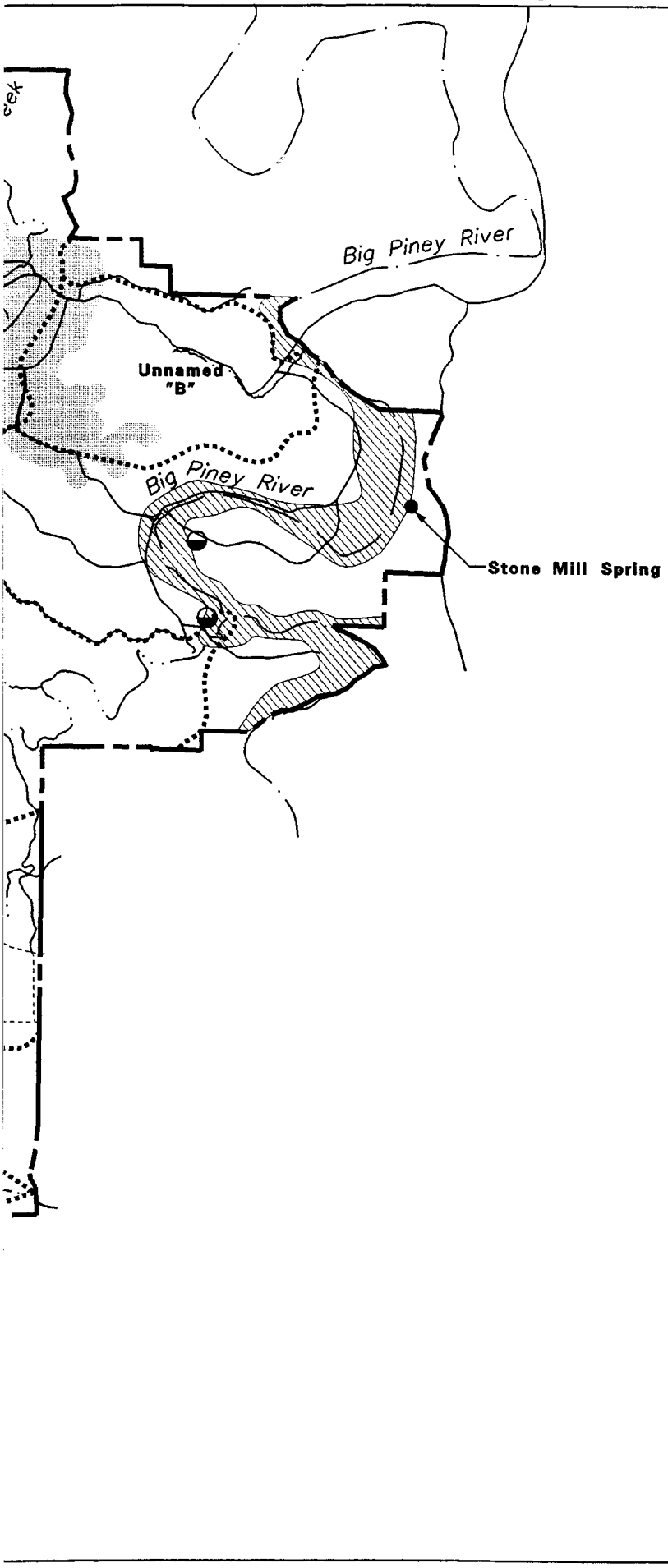
RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**NOISE ZONES**

**DATE: MARCH, 1997** | **FIGURE NO. 4.3**


Roubidoux Creek
Dry Creek
Dry Creek
Ballard Hollow Creek
Wolf Hollow
Smith Branch
Ballard Hollow
Pond Hollow
Unn
Smith Branch
Sediment Control Pond
Creek
Unnamed "A"
Hurd Hollow Creek
Hurd Hollow
Bailey Hollow
McCourtney Hollow
McCann Hollow
Falls Hollow
Musgrave Hollow
Musgrave Hollow Creek
Mush Paddle Hollow
Turnbull Hollow
Caby Hollow
Roubidoux Creek

S\BC-SWAT.DGN




## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- CANTONMENT AREA
- REGULATORY FLOODPLAIN (100 year)
- IMPOUNDMENT
- WATERSHED BOUNDARY
- WATER SUPPLY WELL

SOURCE MATERIAL:
FEMA, 1985
HBA, 1996

N

0 1 2 3

Scale in Miles

HARLAND BARTHOLOMEW & ASSOCIATES, INC
ST LOUIS, MISSOURI

KANSAS CITY DISTRICT
US ARMY CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**WATER RESOURCES**

**DATE: MARCH, 1997** | **FIGURE NO. 4.4**

## 4.5 WATER RESOURCES

This section describes surface water resources including rivers, streams, lakes and ponds. A discussion of floodplain constraints is also included in this section.

### 4.5.1 Surface Water

Major surface water features at FLW include the Big Piney River located on the east side of the installation, Roubidoux Creek on the west and Dry Creek on the north. The Big Piney River and Roubidoux Creek originate to the south of the installation and flow north, to their confluence with the Gasconade River. These surface water features are illustrated in Figure 4.4. Beyond the river bluffs, the landscape is dissected by ravines and small valleys which contain tributaries to the major rivers. There are numerous small springs and seeps on the installation, and most tributary streams have a spring that either originates or substantially supplements the stream flow. Some horizontal movement to intermittent seeps and springs along the steeper slopes leading into the major valleys may occur.

**4.5.1.1 Big Piney River.** The Big Piney River, a principal tributary of the Gasconade River, flows for 9.5 miles along the eastern boundary and through FLW. The main stem of the Big Piney River has a reach of approximately 94 miles that maintains permanent flow and an additional reach of approximately 31 miles that maintains permanent pools. It has a drainage basin of 768 square miles, of which 580 square miles are upstream from FLW. The river flows to the north with an average gradient of 5.2 feet per mile.

Flow records dating from 1921-1982 and 1988-1994 are available from the United States Geological Survey (USGS) gauging station at the town of Big Piney, approximately 30 miles upstream from the Gasconade River. Annual mean, peak and low flows recorded at that station are summarized in Table 4.6.

**Table 4.6:**
**Stream Flow, Big Piney River, Period of Record: (1921-1982, 1988-1994)**

| Flow | Cubic Feet per Second | Million Gallons per Day |
|---|---|---|
| Annual Mean | 544 | 351 |
| Instantaneous Peak Flow | 32,700 | 21,124 |
| Instantaneous Low Flow | 69 | 45 |
| Annual Seven-Day Minimum | 71 | 46 |

*Source: U.S. Geological Survey*

The Big Piney River has a relatively uniform base flow which is sustained during dry periods by springs. Six of the springs have minimum flows of 3.2 million gallons per day (MGD). These springs are Boiling, Miller, Prewett, Shanghai, Slabtown and Stone Mill. At normal flows, the river bed ranges from 150-300 feet wide at an average depth of 2.5 to 3.0 feet. The stream banks consist of silt loam and sandy clay loam 8 to 11 feet high. The river bottom is comprised of gravel and cobbles in the riffles with sand and small gravel in pools and slackwater areas.

The MDNR classifies the Big Piney River as a Class P stream, one which maintains permanent flow even in drought periods (10 CSR 20-7) (CSR, 1994). The river's use designations are given in Table 4.7. The Big Piney River is the principal source of potable water for FLW.

Water quality data has been collected north of the installation at Devil's Elbow, Missouri by the USGS between July 1976 to September 1989 and October 1992 to September 1995. This data indicates that the water of the Big Piney River is well-aerated, slightly basic and moderately hard. Dissolved oxygen levels ranged from 5.2 to 17.0 mg/L with an average value of 9.8 mg/L. The pH within the river ranged from 7.1 to 8.5 with an median value of 7.9. Total hardness as determined by $CaCO_3$ ranged from 52 to 200 mg/L with an average value of 150 mg/L. Total suspended solids ranged from less than 1.0 to 230 mg/L with an

average value of 12 mg/L. This wide range may be a result of rainfall events within the watershed. Trace metals such as cadmium (Cd), copper (Cu), iron (Fe), lead (Pb), manganese (Mn), mercury (Hg) and zinc (Zn) were below applicable MDNR water quality standards. An occasional exceedence of water quality standards for cadmium, lead and mercury was found at Devil's Elbow, Missouri during the time period July 1977 through January 1984. Fecal coliform levels frequently exceeded the applicable state water quality standard.

Benthic invertebrates were collected from the Big Piney River in February 1996. Samples have indicated a healthy population of invertebrates and the presence of pollution intolerant taxa (ES, 1996a). Overall the benthic invertebrates collected were indicative of good water quality. Subsection 4.11.2.6 contains additional discussion concerning invertebrate resources.

**Table 4.7:**
**Stream Classification and Use Designation**

| | | | | Designation | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stream** | **Class** | **Miles** | **Location** | **IRR** | **LWW** | **AQL** | **CLF** | **CDF** | **WBC** | **BTG** | **DWS** |
| Big Piney River | P | 99.0 | includes eastern boundary of FLW to mouth of river | X | X | X | X | | X | X | X |
| Big Piney River | P | 4.0 | south of FLW to include eastern boundary of FLW | | X | X | | | X | X | X |
| Roubidoux Creek | P | 4.0 | mouth of creek to north of FLW | | X | X | | X | X | X | |
| Roubidoux Creek | C | 20.0 | north of FLW to southwest boundary of FLW | | X | X | X | | X | X | |
| Roubidoux Creek | P | 18.0 | southwest boundary of FLW to south of FLW | | X | X | X | | X | X | |

Class P - A stream which maintains permanent flow even in drought periods.
Class C - A stream which may cease to flow in dry periods, but maintains permanent pools which support aquatic life.

| | | | | | |
|---|---|---|---|---|---|
| IRR - | Irrigation | CLF - | Cool Water Fishery | BTG - | Boating and Canoeing |
| LWW - | Livestock & Wildlife Watering | CDF - | Cold Water Fishery | DWS - | Drinking Water Supply |
| AQL - | Protection of Warm Water Aquatic Life and Human Health - Fish Consumption | WBC - | Whole Body Contact Recreation | | |

*Source: 10 CSR 20-7 (CSR, 1994)*

The main tributaries of the Big Piney River which drain FLW are Dry Creek, McCourtney Hollow and Falls Hollow. Dry Creek drains the northeast portion of the installation and collects discharges from the cantonment area. McCourtney Hollow and Falls Hollow drain the southeast portion of the installation and collect run-off from undeveloped maneuver and impact areas. Several significant unnamed tributaries to the Big Piney River also drain portions of FLW. Many of the Big Piney Creek's tributaries are known or suspected losing streams, which are defined as streams that distribute 30 percent or more of their flow into an aquifer through natural processes, such as infiltration through permeable subsoil or cavernous bedrock.

Five stormwater outfalls located in the Big Piney River watershed are monitored in accordance with Missouri State Operating Permit MO-0117251 (subsection 4.10.2). This permit requires a discharge limitation of 10 mg/L (monthly average) oil and grease, and 15 mg/L (monthly average) total petroleum hydrocarbons (TPH). Monitoring data results since July, 1995 have not shown an exceedence of the permit limits for oil and grease or TPH.

**4.5.1.2 Roubidoux Creek.** Roubidoux Creek flows north meandering through 16 miles of FLW, eventually discharging into the Gasconade River. Ballard Hollow, Caby Hollow, Hurd Hollow, Musgrave Hollow, Smith Branch, McCann Hollow, Bailey Hollow, Pond Hollow, Wolf Hollow and Turnbull Hollow all

drain into Roubidoux Creek. Roubidoux Creek is classified as a losing stream, which is defined as a stream that distributes 30 percent or more of its flow into an aquifer through natural processes, such as infiltration through permeable subsoil or cavernous bedrock. Many of Roubidoux Creek's tributaries are also known or suspected losing streams.

Since Roubidoux Creek is a losing stream, determining water flow, with or without gauging stations, is at best approximate. The USGS has not maintained a gauging station along Roubidoux Creek since it is a losing stream. Therefore, stream flow information is not available. The stream banks consist of silt loam and clay loam, generally 8-11 feet high. The stream bottom consists of gravel with sand in pools and slackwater areas. Upstream of the installation, the creek has clear, permanent flow. As the creek traverses through the installation, the streambed is relatively dry until just north of the installation near Waynesville, where the creek is recharged by Roubidoux Spring.

The MDNR has classified a 20-mile segment of Roubidoux Creek as a Class C stream, one which may cease flow in dry periods but maintain permanent pools which support aquatic life. The remaining portions of the stream are classified as Class P. The stream's use classifications are given in Table 4.7. A 4-mile segment of the Roubidoux Creek north of the installation (Roubidoux Spring to the Gasconade River) has been designated a cold water sport fishery. This designation as defined by the MDNR includes waters in which naturally occurring water quality and habitat conditions allow the maintenance of a naturally reproducing or stocked trout fishery and other naturally reproducing populations of important recreational fish species (10 CSR 20-7) (CSR, 1994).

A dye tracer study conducted in October 1970 indicates that water disappearing from Roubidoux Creek reemerges at Roubidoux Spring. Water quality data collected by the USGS within the timeframe of October 1993 to September 1995 indicates water from the spring is well-aerated (dissolved oxygen=8.1 mg/L), slightly basic (pH=7.5) and moderately hard ($CaCO_3$=160 mg/L). Trace metals such as cadmium (Cd), copper (Cu), iron (Fe), lead (Pb), manganese (Mn), mercury (Hg), and zinc (Zn) were below applicable MDNR water quality standards.

Benthic invertebrate samples were collected from Roubidoux Creek in February 1996. Samples have indicated a healthy population of invertebrates and the presence of intolerant taxa (ES, 1996a). Overall, the benthic invertebrates collected were indicative of good water quality (ES, 1996a). Subsection 4.11.2.6, under Fish and Wildlife, contains additional information on the invertebrate population.

Seven stormwater outfalls located in the Roubidoux Creek watershed are monitored in accordance with Missouri State Operating Permit MO-0117251 (subsection 4.10.2 contains additional information). This permit requires a discharge limitation of 10 mg/L (monthly average) for oil and grease, and 15 mg/L (monthly average) TPH. Monitoring data results have not shown an exceedence of the final permit limitations for oil and grease, or TPH.

**4.5.1.3 Dry Creek.** Dry Creek is classified as a losing stream and is considered to be losing year-round. Dry Creek drains the northeastern portion of the installation, which contains the majority of the cantonment area and discharges into the Big Piney River.

What streamflow there is occurs mainly as a result of the discharge from the wastewater treatment plant at FLW. This discharge is in accordance with a National Pollution Discharge Elimination System (NPDES) permit. Intermittent stormwater flows are frequent in the spring and during intense or extended periods of rainfall. The streambed width is generally 10-30 feet. The streambanks consist of silt loam and sandy clay four to five feet high, with the streambed consisting primarily of gravel with some sand.

**4.5.1.4 Stone Mill Spring.** Stone Mill Spring is the largest spring on FLW. It is located on the east bank of the Big Piney River, east of the cantonment area along the eastern most boundary of the installation. Figure 4.4 depicts the location of the spring. Flow records date from 1925 to 1966, and indicate an average flow of 18.7 MGD, a maximum of 34.2 MGD, and a minimum of 11 MGD. A levee was constructed between the Big Piney River and the spring in 1970 to preclude the river from flowing through the spring except during periods of high flow. Stone Mill Spring Branch has been designated as a cold

water sport fishery by the MDNR (10 CSR 20-7) (CSR, 1994). The area is designated as Stone Mill Spring Trout Management Area and is managed by the FLW Directorate of Public Works in cooperation with the Missouri Department of Conservation (MDC).

**4.5.1.5 Other Streams.** Musgrave Hollow and the lower portion of Ballard Hollow are both suspected gaining streams. The remaining streams located on FLW are intermittent, flowing into either the Big Piney River or Roubidoux Creek. The primary stream courses and drainage areas are identified in Figure 4.4. These include McCourtney Hollow, Falls Hollow, Musgrave Hollow, Turnbull Hollow, Hurd Hollow, Ballard Hollow, Wolf Hollow and Smith Branch. The flow patterns associated with these streams occur during the spring snow melt and during intense or extended periods of rainfall. Flow occurs in streambeds ranging from 10 to 50 feet and at a depth of six to eight feet for the 10-year recurrence interval flood event. Streambanks are normally three to four feet high, and consist of silt and sandy clay loam. Flow is carried over a bed of gravel with some sand.

**4.5.1.6 Lakes/Impoundments.** A total of 19 well-defined lakes, ponds and impoundments ranging in size from one-half to 50 acres are located at FLW. Together, these bodies of water cover approximately 100 acres. A summary of these lakes and water impoundments by category is provided in Table 4.8. These categories, with the exception of the sinkhole ponds, are manmade reservoirs. Where practical, impoundments are stocked with bass, bluegill, and catfish and managed as a recreational fishery. Bloodland Lake and Penn's Pond are the two primary fishing and waterside recreation lakes on FLW.

**Table 4.8:**
**Lakes/Impoundments on Fort Leonard Wood**

| Category | Number | Acreage |
|---|---|---|
| Wildlife Management | 3 | 59.6 |
| Sediment Control | 5 | 25.1 |
| Farm Ponds/Fishing | 5 | 8.1 |
| Gravel Pits | 3 | 5.9 |
| Sinkhole Ponds | 3 | 2.1 |
| Total | 19 | 100.8 |

*Source: Greenehorne & O'Meara, Fort Leonard Wood Terrain Analysis (GOM, 1982)*

The largest lake, Bloodland Lake, is located in the Wildlife Management and Recreation Area just south of the cantonment area and west of Range Control. The lake has a surface area of approximately 50 acres, and accounts for one-half of the total impounded surface acreage for the installation. Penn's Pond has a surface area of approximately 8.8 acres. The MDNR classifies Bloodland Lake and Penn's Pond as Class L3 lakes. Class L3 lakes are defined as other lakes which are waters of the state including both public and private lakes (10 CSR 20-7) (CSR, 1994). Bloodland Lake and Penn's Pond are designated for the following uses: (1) livestock and wildlife watering; (2) protection of warm water aquatic life and fish consumption; and (3) boating and canoeing.

Several of the primary sediment control ponds are located in training areas and at the heavy equipment training area. The sediment ponds are functioning as designed, which is to collect and trap sediment from disturbed areas and to protect the downstream drainages.

Approximately 40 other impoundments, ranging in size from 0.1 to 0.5 acres, are scattered throughout the installation. These impoundments have "multi-purpose" functions. Watershed management, sediment control and wildlife habitat enhancement are the primary functions, however, some are managed for recreational fisheries.

### 4.5.2 Floodplains

High discharge periods on the waterways within the FLW area generally occur in April and May. However, flash floods can occur throughout the year as a result of intense thunderstorm activity. Areas within the 100-year regulatory floodplain have been designated on all of the major waterways flowing through FLW. These include land along the Big Piney River, Roubidoux Creek, Smith Branch, Dry Creek, Ballard Hollow, Hurd Hollow, Musgrave Hollow and Turnbull Hollow as illustrated on Figure 4.4. These areas are designated "Zone A" on the 1985 Flood Insurance Rate Maps for Pulaski County as issued by the Federal Emergency Management Agency (FEMA, 1985). The 100-year regulatory floodplain of the Big Piney River encompasses 1,150 acres and includes the TA 250 river crossing/bridge pond, the Happy Hollow Recreation Area and an 18-hole golf course (RPC, 1981). All of these facilities are designed to withstand occasional flooding. Development activities in regulatory floodplain areas are limited in accordance with Executive Orders 11988 and 11990, which address floodplains and wetlands.

### 4.5.3 Hydrogeology/Groundwater

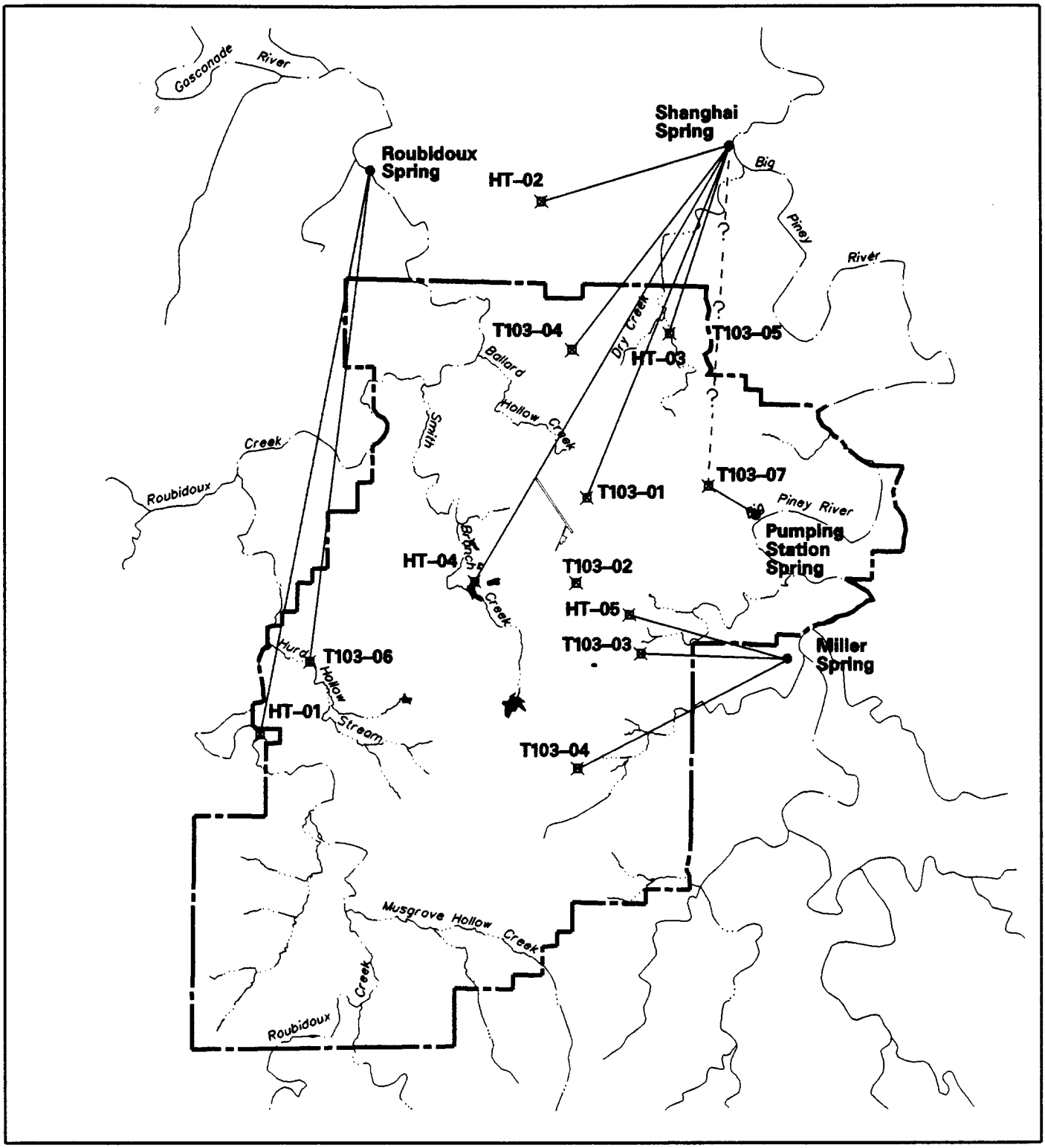
The hydrology of the groundwater system is influenced by the karst terrain of the installation. Sinkholes, springs, losing streams and caves provide a connection between surface waters and the groundwater system that has been documented in previous studies (B&V, 1978 and MDNR, 1982b). An extensive investigation of the occurrence of groundwater conditions at FLW, including dye tracing of groundwater movement, has recently been conducted by the U.S. Geological Survey (FLW, 1996a).

Water falling on the ground at FLW may either run off or infiltrate into the soil. Water infiltrating into the soil will percolate downward through the soil and clay residuum before entering the underlying sandstone and dolomite bedrock. The presence of a fragipan (a brittle, low permeability horizon in the lower soil zone) in the soils at FLW may result in localized movement of water infiltrating into the ground to small seeps, or locally perched water tables. Research with similar soils in the central Missouri area indicates that the ability of fragipans to restrict downward migration of water is limited by the presence of discontinuities in the fragipan (FLW, 1996a). In most areas of the uplands, the depth to the water table is relatively deep. The U.S. Geological Survey reports that depth to groundwater in shallow monitoring wells located on the ridge tops commonly exceeds 100 feet below land surface.

Groundwater moving through the rock formations will dissolve small quantities of the limestone. Over a period of many years, this results in a widening of the groundwater flow paths. As the flow paths widen, additional water is channeled through the formation, accelerating the formation of the solution-enlarged flow paths. Indications of enhanced groundwater flow along solution-enlarged flow paths at FLW are evidenced by the limited number of sinkholes with open swallow holes and the presence of several stream and creek flows which disappear below ground. Measurements by the USGS indicates that on an outcrop scale, that vertical, solution-enlarged fractures are small in number in comparison to horizontal solution-enlarged bedding-plane features, although both are considered to be of hydrogeologic importance. Most of the sinkholes on the base are concentrated into distinct areas within or near the cantonment area. A small percentage of the sinkholes have open access to the subsurface, and will allow water to freely move to the saturated zone. Most of the sinkholes are plugged at least partially with clay residuum or organic material.

There are numerous indications of horizontal solution-enhanced flow paths in the FLW area. Examination of rock outcrops indicate that approximately 20 percent of bedding planes within the Gasconade Dolomite show indications of solution enhancement (Harrison, 1996). Large springs are present within the valleys of the Roubidoux Creek and the Big Piney River. These springs discharge water that infiltrates or enters sinkholes located along the central ridge on which FLW is located. Many springs occur near the middle of the Gasconade Dolomite sequence.

Twelve dye traces are reported to have been conducted on FLW. Results of the dye traces are shown on Figure 4.5. Two of these traces were conducted on the western side of the reservation. Dye was injected at the point of flow loss under low-flow conditions in Roubidoux Creek and at a losing stream in Hurd Hollow. Dye from both of these tests was detected at Roubidoux Spring 8.5 to 10 miles north of the dye




LEGEND

- INSTALLATION BOUNDARY
- CREEK/RIVER
- INTERMITTENT STREAM
- IMPOUNDMENT
- T103-06 — DYE TRACE TEST AND NUMBER - CONDUCTED DURING
- HT-05 — DYE TRACE TEST AND NUMBER - HISTORICAL DATA

N

SCALE IN MILES

0 2.5 5.0

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KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

# DYE TRACES

DATE: MARCH, 1997 | FIGURE NO. 4.5

injection points (FLW, 1996). Six dye traces are reported in the north-central portion of the FLW reservation. Dye from four of these traces was detected at Shanghai Spring, northeast of FLW. Dye injected near the southern edge of a former landfill was not recovered in a four-month monitoring period. Dye from the remaining test was not definitively detected at any of the monitoring points. Dye injection locations for the four successful traces included Dry Creek near the FLW wastewater treatment plant, a sinkhole that formed in a small lake near Smith Branch, a sinkhole located north of the Forney Army Airfield control tower and a sinkhole near the west end of Pulaski Avenue. The minimum flow distance for these dye traces ranged from 3.4 to 8.8 miles. Dye from three traces conducted in the east-central portion of the reservation was detected at Miller Spring (FLW, 1996a). Injection locations for these tests included a sinkhole at the edge of Range 19 Lake, a sinkhole south of Bradford Cemetery and a sinkhole near the northern edge of Range 18. The minimum flow distance for these traces range from 2.5 to 4.1 miles. Dye injected into a sinkhole near the intersection of roads FLW 24 and FLW 22 at the eastern edge of the cantonment area was detected at a spring near the pumping station on the Big Piney River one mile to the east southeast. Dye was also detected at Shanghai Spring during this test. The concentration of dye detected at Shanghai Spring could not be distinguished from fluctuating background levels of dye remaining from previous tests. The results of the dye traces indicates that the groundwater divide between the Big Piney River and Roubidoux Creek drainages lies west of the surface water divide for the two basins.

Groundwater is available from several permeable zones within the Ozark aquifer which underlies FLW. The most productive formation within the Ozark aquifer at FLW is the Potosi Dolomite. Located at a depth between 800 to 1000 feet below the surface, this formation produces large quantities (80 to 750 gallons per minute (gpm)) of water. Groundwater generally flows northward, although the karst terrain may cause local variations in groundwater flow. Recharge to the aquifers occurs through losing streams, sinkholes, and infiltration to the soils.

There are no geologic units above the base of the Potosi Dolomite that will act as a confining layer to prevent groundwater movement across the unit. Vertical flow of water between the Potosi Dolomite and the Gasconade Dolomite, however, is probably very slight. The USGS reports that vertical head differences between the two units are variable, but are typically limited to less than 10 feet. This small head difference results in a small gradient, which will result in limited flow, particularly given the high horizontal permeability compared to the vertical permeability.

Most of the drinking water used at FLW is obtained from a surface water intake on the Big Piney River with supplemental water supplied by a standby well at the Lieber Heights housing area. Eight other wells are located on FLW, of which five are working and three have been capped. The three capped wells cannot be returned to service. The five active wells supply potable water to the ammunition supply point, golf course, rock quarry, Cannon Range and Range Control. Approximate yields from these wells range from 50 to 300 gpm. Water samples are periodically collected from potable groundwater wells for analysis, and all of the wells are in compliance with Federal and state drinking water standards.

All of these wells are reported to be screened in the Potosi Dolomite (B&V WST, 1992). The city of Waynesville uses four wells screened in the Potosi Dolomite to supply water to the city and the city of St. Roberts obtains drinking water from three wells screened in the Potosi Dolomite (B&V WST, 1992).

## 4.6 GEOLOGY

This section describes the geologic formations at FLW, the occurrence of sinkholes and karst terrain, the presence of caves, a description of past seismic activity, and a general description of the soil associations.

### 4.6.1 Geology

**4.6.1.1 Geologic Formations.** Unconsolidated alluvial deposits consisting of gravel, sand, and silt, which occur on the floodplains of the Big Piney River and Roubidoux Creek, are the youngest sediments on FLW. Stony, sandy, clay colluvial deposits, which are closely associated with floodplain sediments, are found in the channels of the major tributaries of the Roubidoux Creek and Big Piney River, and on the

edge of the floodplains. These deposits exhibit generally poor foundation stability and are subject to occasional flooding.

The Jefferson City Dolomite, the youngest of the three formation of Ordovician rocks exposed at FLW, occupies the higher elevations of the plateau and is common in the southern portions of the reservation. The lower portion consists of a massive, gray, finely crystalline bed of dolomite locally known as "cotton rock." Above this layer is a buff to gray, somewhat siliceous, crystalline bed of dolomite that contains abundant small cavities filled with fine white crystalline quartz or calcite known as Quarry Ledge. Although the Quarry Ledge could provide excellent support for heavy structures, the Jefferson City formation generally weathers to a plastic clay of low permeability, which could result in severe drainage problems.

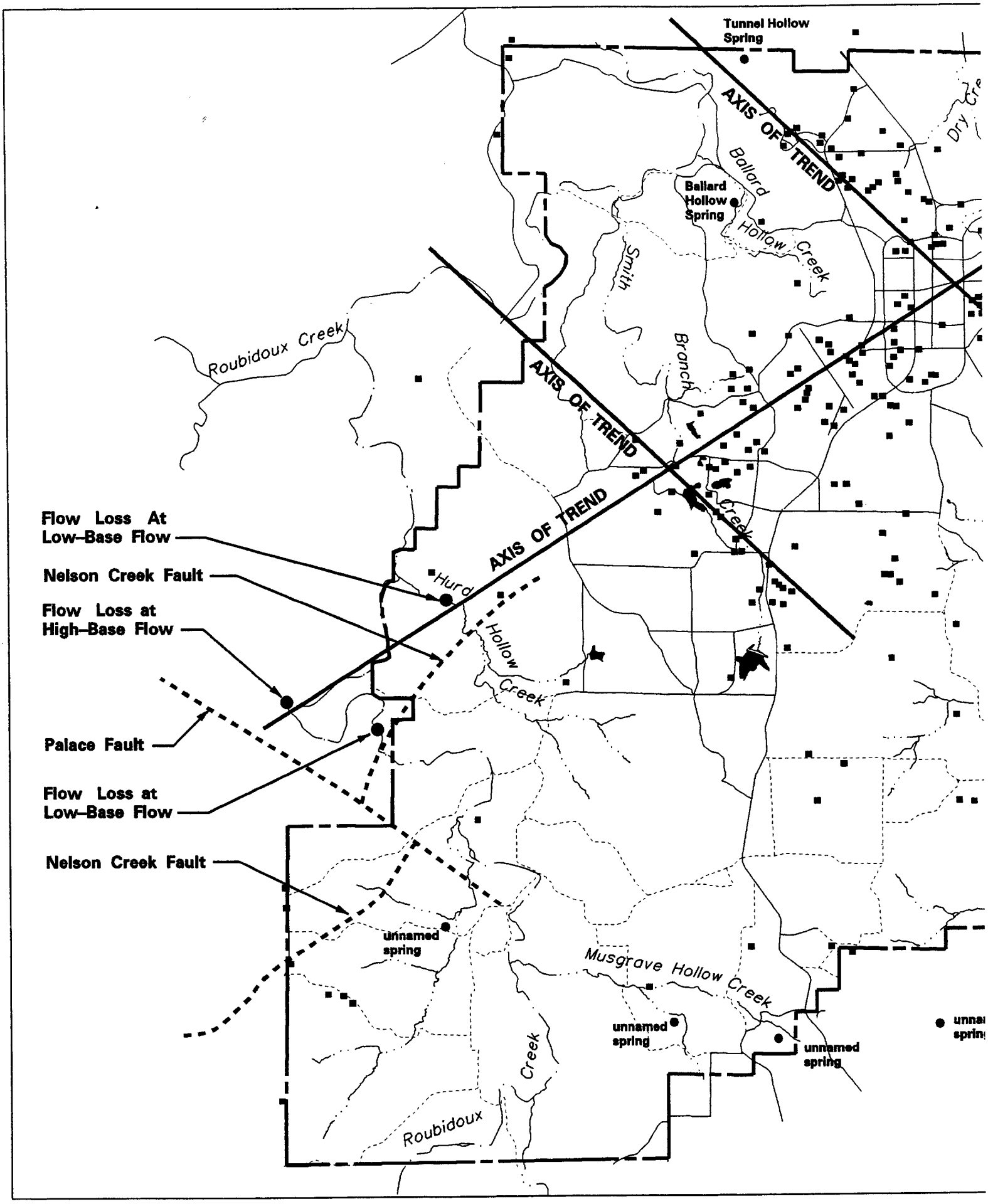
The Roubidoux Formation, consisting of quartz sandstone and cherty dolomite, underlies the Jefferson City Dolomite. It is widely exposed along the river bluff crests and in the dissected zone behind the bluffs, particularly in the northern portions of the reservation, where the Roubidoux is typically the uppermost geologic unit exposed. The lower portion of the Roubidoux is predominantly dolomite, whereas the upper portion is predominantly sandstone. Most fractures within the Roubidoux are not through-cutting. The upper surface of the Roubidoux Formation is highly variable. The variability of the upper surface of the Roubidoux may be due to extensive dissolution of the lower dolomite-rich portion of the unit and subsequent collapse of the overlying sandstone-rich strata.

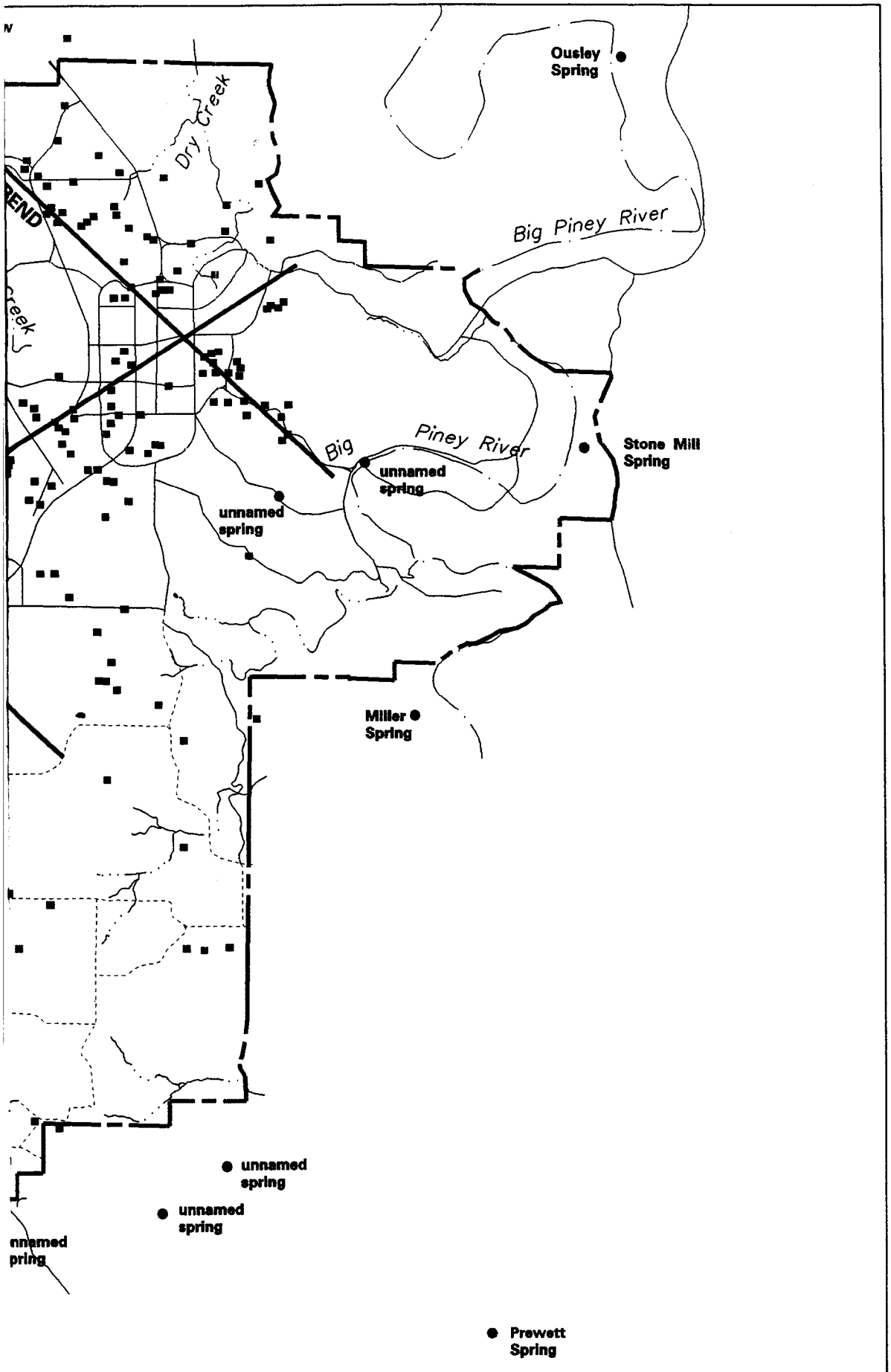
The oldest of the Ordovician formations exposed at FLW, the Gasconade Dolomite, is exposed along the Big Piney River and Roubidoux Creek, and several tributary hollows where it forms cliffs and steep bluffs. The Gasconade Dolomite consists of an upper, massively bedded, relatively chert-free unit with a thickness of approximately 30 to 50 feet. Horizons of fractured rock with a thickness of up to 4 feet are common in the upper Gasconade. A persistent chert horizon with a thickness of 10 to 15 feet separates the upper and lower portions of the Gasconade in the FLW area. The lower unit is also massively bedded, but contains abundant chert. The thickness of the lower unit ranges from 230 to 260 feet (Middendorf, 1991). The only active quarry on the installation is located in an area of exposed Gasconade Dolomite. Consequently, the formation is the primary source of aggregate for range maintenance and training operations on FLW. Aggregate for construction of new facilities will be supplied from off-post sources. Detailed examination of outcrops of the Gasconade Dolomite at FLW indicates that most vertical fractures are not continuous and evidence of solution-enlargement was noted on relatively few of the fractures.

Rocks of Cambrian age underlie the Gunter Sandstone Member of the Gasconade Dolomite. The uppermost Cambrian unit is the Eminence Dolomite. The Eminence Dolomite is a medium to coarsely crystalline dolomite. The unit is massive to medium bedded, with only small amounts of chert present. The chert present in the unit is concentrated in the upper portion of the unit. The Eminence Dolomite is generally more than 250 feet thick. The Potosi Dolomite underlies the Eminence Dolomite. The Potosi Dolomite is a fine to medium grained crystalline dolomite. The unit is massively bedded, and contains abundant chert. The Potosi Dolomite is generally less than 300 feet thick.

**4.6.1.2 Karst Features.** The dolomites exposed in the region are highly susceptible to solution by groundwater. Karst features such as sinkholes, caves and springs, are evident throughout FLW but are most prevalent in the cantonment area and northern portion of the reservation. A sinkhole map of the installation was prepared as a part of a groundwater investigation conducted by the USGS, Water Resources Division (FLW, 1996a). Sinkholes were identified based on three data sources. The first data source was electronic topographic data from the USGS, National Mapping Division. Electronic topographic data provided by FLW (2 foot contours in the cantonment, 5 foot contours in other areas) was the second data source. The closed contour data was inspected to identify man-made closed contours, typically by grading near roads or structures. The third data source was field observations. Figure 4.6 shows a concentration of sinkholes in the cantonment area, with few sinkholes in the southern portions of the base.

Karst features present at FLW, in addition to the sinkholes, include large discharge springs, creeks that lose their flow and caves. A number of springs are located within or near FLW. These include: Shanghai, Miller, Stone Mill, Tunnel Hollow, Ballard Hollow, Roubidoux, Ousley, Falling, Creasey, Bartlett


Tunnel Hollow Spring
AXIS OF TREND
Ballard Hollow Spring
Ballard Hollow Creek
Smith Branch
Roubidoux Creek
AXIS OF TREND
AXIS OF TREND
Flow Loss At Low-Base Flow
Nelson Creek Fault
Flow Loss at High-Base Flow
Hurd Creek
Hollow Creek
Palace Fault
Flow Loss at Low-Base Flow
Nelson Creek Fault
unnamed spring
Musgrave Hollow Creek
unnamed spring
unnamed spring
Roubidoux Creek




LEGEND

INSTALLATION

ALL WEATHER

SEASONAL RO

CREEK / RIVI

INTERMITTENT

IMPOUNDMENT

SINKHOLE LO

SPRING LOCA

SOURCE MATERIAL: HBA, 1996.

N

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Scale ir

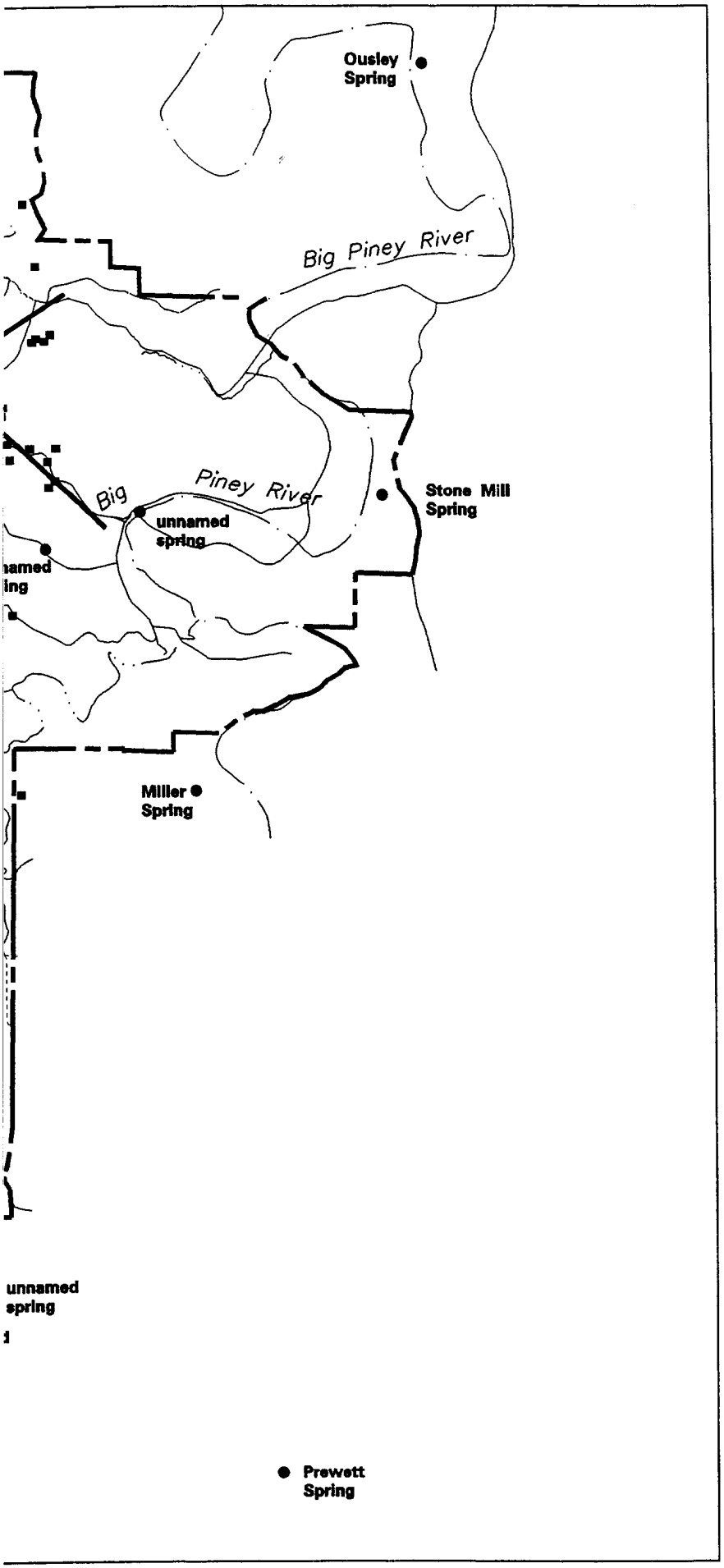
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ENVIRONMENTAL IMPACT

RELOCATION OF U.S. ARMY C AND U.S. ARMY MILITARY POL FORT LEONARD WOOD,

**DISTRIBUTION OF S AND SPRING**

**DATE: MARCH, 1997** | **FIGU**




LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- IMPOUNDMENT
- SINKHOLE LOCATION
- SPRING LOCATION

SOURCE MATERIAL: HBA, 1996.

N

0 1 2 3

Scale in Miles

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ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**DISTRIBUTION OF SINKHOLES AND SPRINGS**

**DATE: MARCH, 1997** | **FIGURE NO. 4.6**

Mill and Prewett Springs. Roubidoux Creek looses its flow to ground water in the southwest portion of FLW. A portion of the Roubidoux Creek stream bed is dry except in periods of extremely high flow. The point at which the Roubidoux Creek looses its flow under low flow conditions coincides with the Hurd Hollow Fault. The location of flow loss under higher flow conditions coincides with the projection of the northeast-southwest alignment of sinkholes.

**4.6.1.3 Caves.** The karst region in which FLW is located is noted for the number of caves present. Fifty caves have been documented at FLW as a part of an installation-wide inventory (Oesch, 1986). Sunlight remains visible at the deepest portion of approximately one quarter of the caves inventoried. Most of the caves had either no spelothems (cave formations such as stalactites, stalagmites, flowstone or gypsum crystals) or had spelothems of limited extent and quality. Folly, Henshaw, Joy and Martin Caves had cave formations that were noted as numerous or of good quality. Cave formation is an ongoing process at FLW. An example is the recent collapse of a sinkhole that created Boundary Pit Cave. Most of the caves found on FLW are located above the water table, and thus are generally dry.

### 4.6.2 Seismicity

Faults identified in the FLW area include the Countyline fault and the Hurd Hollow fault. These local faults date back possibly as far as the early Ordovician (approximately 500 million years). The Countyline fault is assumed to be a strike slip fault with an essentially vertical fault plane. There is no information to suggest any recent activity on these faults.

FLW is located approximately 150 miles northwest of the New Madrid Seismic Zone, centered in southeast Missouri. The New Madrid Fault Zone is noted for producing some of the largest magnitude earthquakes noted within the continental United States, although perceptible seismic activity is infrequent. The Uniform Building Code presents a seismic zone map for the United States. FLW lies near the boundary between Zone 1 and Zone 2A with respect to this map (ICBO, 1994). In 1811 and 1812 four large earthquakes occurred throughout the New Madrid Fault Zone. Three of these quakes are believed to have had magnitudes exceeding 8.0, with the shock of December 16, 1811 estimated to have a magnitude of 8.6. This quake was felt in an area over one million square miles, created two large lakes (Richter, 1958) and is generally considered to be the maximum credible earthquake for the region. An 8.6 magnitude earthquake within the New Madrid Fault Zone would be expected to produce a Modified Mercalli Intensity VII at FLW (Hopper, 1995). Expected damage would include broken furniture, cracks in common masonry and toppling of weak chimneys. A magnitude 7.6 earthquake could produce a Modified Mercalli Intensity VI at FLW. The earthquake would be perceptible to all persons; dishes, glassware and windows might break; and masonry in poor condition might be cracked.

### 4.6.3 Soils

The soils of FLW consist primarily of residual material formed on interbedded dolomite and sandstone, and a limited area of young alluvial deposits of sand, silt, gravel and clay located along the floodplains of the Big Piney River and Roubidoux Creek. The Natural Resource Conservation Service (NRCS), formally the Soil Conservation Service, has identified four general soil associations containing a total of 41 distinct mapping units at FLW (SCS, 1989). General soil associations are the Nolin-Huntington-Kickapoo, Clarksville-Gepp, Viration-Clarksville-Doniphan, and the Lebanon-Plato. These associations and their limitations are described in Table 4.9.

**Table 4.9:**
**Major Soil Associations of Fort Leonard Wood**

| Name | Locations | Description |
|---|---|---|
| Nolin-Huntington-Kickapoo | Big Piney River<br>Roubidoux Creek | Deep, well drained alluvial silt loams; susceptibility to flooding constrains development; portions of this association are considered prime farmland. |
| Clarksville-Gepp | Terraces | Deep, moderately steep to steep sloping, somewhat excessively well-drained and well-drained, cherty, very cherty and stony soils; unsuited to building site development or waste disposal due to hazard of erosion. |
| Viration-Clarksville-Doniphan | Bluffs and dissected uplands beyond river valleys (most of cantonment) | Deep, gentle to steep sloping, moderately well-drained to somewhat excessively drained, silty and very cherty; suitable for sanitary facilities and building site development. |
| Lebanon-Plato | Center of Big Piney/Roubidoux moderately sloping uplands in northern portion of the installation. | Deep, gently sloping and moderately sloping, moderately well- and somewhat poorly- drained, silty; suitable for building site development and on-site waste disposal; seasonal wetness, slow and very slow permeability in and below the fragipan, high shrink-swell potential; portions of this association are considered prime farmland. |

*Source: Soil Survey of Pulaski County, (SCS, 1989) and Harland Bartholomew and Associates , Inc.*

## 4.7 INFRASTRUCTURE

This section addresses the existing conditions of FLW as defined by the utilities, solid waste management and transportation systems in place.

### 4.7.1 Utilities

Water treatment and distribution systems, storm and sanitary sewer collection and treatment systems, energy systems, and communications systems must be operated and maintained to support continued training and operational requirements. The major components of these utility systems can be evaluated for their capacity to serve the effective population. Effective population is the population of the installation based on the amount of time each person spends on-post: military living in family housing count as one effective population, civilians working on-post count as one-third effective population. Brief descriptions of each of these systems are provided below.

#### 4.7.1.1 Water

**4.7.1.1.1 Raw Water.** The primary source of water at FLW is the Big Piney River. Water is pumped from the Big Piney to the water treatment plant using pump station containing four electrically powered pumps and one stand-by pump. The capacity of the pumping station is estimated at 9 mgd.

One well located west of Indiana Avenue, near Gasconade Street in the Lieber Heights family housing area, taps the Potosi Dolomite aquifer as discussed in Section 4.5. Average yield for this well, which is connected to the water treatment and distribution systems, is estimated at 320,000 gallons per day (0.32 mgd). There are five other active wells on FLW, which provide water for the remotely located ammunition supply point, golf course, rock quarry, Cannon Range and Range Control. Approximate yields from these wells range from 50 to 300 gpm.

When combined, raw water pumping capacity from the Lieber Heights wells and the Big Piney River is 9.32 mgd. Using an average daily domestic demand of 150 gallons per capita per day and applying a capacity factor for growth and concurrent demand, the existing water supply could support an effective population of 49,086 persons (FLW, 1995c).

**4.7.1.1.2 Potable Water Treatment Capacity.** Raw water is pumped to the treatment plant at Piney Hills Drive and Oklahoma Avenue via two 16-inch lines. The treatment facility has a rated capacity of 9.8 mgd. Prior to chlorination, fluoridation and filtering water is treated by chemical coagulation and sedimentation. After being filtered, the water is pumped into the distribution system. Assuming an average daily domestic demand of 150 gallons per capita per day and applying a capacity factor for growth and concurrent demand, the existing water treatment facilities could support an effective population of 51,917 persons (FLW, 1995c).

**4.7.1.1.3 Water Storage.** Following treatment, water is stored in either one of three elevated storage tanks with a combined capacity of 1.50 million gallons (mg); one 2.25-mg ground storage reservoir near the well on Lieber Heights; or in a 1.50 mg clearwell at the water treatment plant. Together, these storage facilities have a capacity of 5.25 mg and could support an effective population of 54,867 persons (FLW, 1995c).

**4.7.1.1.4 Water Distribution System.** The existing distribution system consists of a network of looped mains ranging in size from six to 16 inches in diameter. Past studies indicate that the network is capable of maintaining adequate water pressures throughout the installation under demand conditions as high as 14.58 mgd. This translates into a supportable effective population of 81,711 persons as delineated in the *Master Plan* (FLW, 1991c).

### 4.7.1.2 Wastewater

**4.7.1.2.1 Collection.** Sanitary sewage is collected in mains that range from six to 27 inches in diameter. All sections 18 inches in diameter and smaller are of vitrified clay or polyvinyl chloride, while larger sections are of concrete. These collectors generally follow the drainage patterns of the cantonment area. The rolling terrain requires the use of 15 lift stations and a more circuitous routing with more manholes than would otherwise be necessary to serve the area. As stated in the *Master Plan* (FLW, 1991c) the estimated system capacity is 8 to 10 mgd.

The Normandy Training Area (TA 244) was recently connected with the installation's wastewater collection and treatment systems. Other training areas outside the cantonment are dependent on septic systems.

**4.7.1.2.2 Treatment.** The wastewater treatment plant, located north of the cantonment area, discharges to Dry Creek, a tributary of the Big Piney River. Originally completed in 1943, the plant has been modernized to meet current standards. Recent plant innovations/renovations have led to an USEPA Certificate of Merit for Operations and Maintenance in the category of Advanced Treatment for plants that treat 1-10 MGD. Secondary treatment is provided by high-rate trickling filters followed by effluent filtration and chlorination. The plant is designed for an average daily flow of 6.0 MG, with a maximum design flow of 8.4 MGD. Excess flow is bypassed to the storm water holding facilities. Using a contribution rate of 111 gallons per capita per day, the wastewater treatment plant can support an effective population of 75,676 persons (FLW, 1995c).

Following treatment, wastewater is discharged into Dry Creek which flows into the Big Piney River. During the summer months, Dry Creek is a losing stream and streamflow occurs mainly as a result of the effluent discharge. The effluent discharge is in compliance with NPDES permit number MO-0029742 which maintains the water quality of Dry Creek.

### 4.7.1.3 Storm Water

Enclosed storm drainage systems exist in the family housing and community center areas, Specker Barracks, the Engineer School site, and the training brigade area bounded by Fourth Street, Iowa, Alabama and South Dakota avenues. Storm water and surface drainage is carried in short collecting lines and systems which discharge the water at various points. The water then flows from these discharge points, and from the remainder of the installation, by open ditches and culverts. These ditches and culverts allow the water to eventually meander into natural ravines, intermittent streams in hollows, and

flow into either the Big Piney River or Roubidoux Creek. As noted in Section 4.10.2.2 all storm water discharges are permitted in accordance with MDNR regulations.

### 4.7.1.4 Energy

**4.7.1.4.1 Electrical System.** Electrical power is provided to FLW by Sho-Me Power Corporation, which is affiliated with the Rural Electrification Association. Power is provided to FLW Substation 4 at 161 kilovolts (KV) from the Sho-Me Power Corporation facilities at Salem, Franks and Lebanon substations. These facilities can also be serviced by Southwestern Power Administration, Central Electric Cooperative and Union Electric Light and Power Company lines. The three 161-KV feeders enter FLW Substation 4, where voltage is stepped down to 69 KV. Substation 4 has a secondary capacity of 75,000 kilovolt-amperes (KVA) when cooled by outside air.

The switching station at FLW Substation 1 can receive power from the Sho-Me Power facilities at Crocker, Maries and FLW Substation 4 at 69 KV sub-transmission voltage. Further reliability is provided to the loop system through a 69-KV loop at a location which is remote to Substation 1.

Substation capacity is the sum of the individual secondary capacities of Substations 1, 2, 3, and 5, or 52,500 KVA. Dividing this capacity by the historical usage rate of 1.23 KVA per capita demand results in the ability to support a maximum effective population of 42,682 persons. Secondary power electrical generators can provide electrical power to individual areas of the installation in the event emergency power is needed.

**4.7.1.4.2 Heating Systems.** Buildings at FLW are heated by one of the six central plants or by individual single-building systems. In general, most of the temporary facilities are heated by individual oil-fired, forced-air furnaces.

- **Natural Gas.** Natural gas is provided to the installation by the Omega Gas Company via a Missouri Pipeline Company natural gas pipeline. The pipeline parallels the I-44 corridor, north of the installation with an 8-inch spur servicing the installation.

- **Liquified Petroleum Gas.** Liquified Petroleum Gas (LPG) is transported via trucks to the installation and stored at the LPG storage facility north of First Street. This facility, with 13 storage tanks, has a total storage capacity of 390,000 gallons. A few on-post facilities are still served by the LPG distribution system. Following completion of the natural gas service, FLW will still use an estimated 1.5 mg of LPG per year (down from 2.905 MG in Fiscal Year (FY) 1989) to heat facilities with individual storage tanks.

- **Fuel Oil.** Fuel Oil, Grades 1 and 2, are also used to heat facilities that are not connected to the natural gas or LPG distribution systems. The fuel is delivered to the central storage facility by semitrailers, where the fuel is stored until needed at individual facilities. Delivery on-post is accomplished through the use of 5,000-gallon tanker trucks. An estimated 50,000 gallons of Grade 1 Fuel Oil will be used each year to heat facilities with above ground on-site storage tanks. Over 1,550,000 gallons of Grade 2 Fuel Oil will be used at facilities with underground on-site storage tanks. Grade 1 Fuel Oil includes additives which allow it to withstand the colder above ground storage conditions.

### 4.7.1.5 Communications.

**4.7.1.5.1 Telephone.** The installation is served by both governmental telephones and United Telephone of Missouri systems.

The governmental system provides official phone service through two government-owned digital switches, one in Building 402 and the other in Building 3200, Hoge Hall. The two government switches can serve up to 6,800 lines and are linked by a 900-pair cable which also provides 154 trunks for connection with

off-post commercial, long-distance, toll and Defense Commercial Telephone Network service. These switches have sufficient excess capacity to support anticipated growth of the Master Plan.

United Telephone of Missouri provides personal telephone service to Family Housing, Unaccompanied Personnel Housing and Guest Quarters residents on-post, and interconnection with the rest of the national phone system. A fiber-optic cable owned by United Telephone runs from Building 435 north to St. Robert, on to Rolla and Jefferson City. Some calls are also routed through a microwave relay. United Telephone will install equipment on an as-required basis and indicates that there is no practical limit to their ability to provide private telephone service to users on the installation.

**4.7.1.5.2 Cable Television.** Cable television service is provided to subscribers by Cable America Corporation. Cable America Corporation has an office in St. Robert and uses established utility easements to provide cable service to FLW.

**4.7.1.5.3 Radio Communications.** A high-frequency radio station, located in Building 6150, provides on-post service and connection with other Army installations through the Military Affiliate Radio System (MARS). The U.S. Customs Service also operates and maintains a high frequency radio monitoring and direction finding system, including a 60-foot antenna, operations building, and antenna field at FLW.

### 4.7.2 Solid Waste

**4.7.2.1 Solid Waste Disposal.** Solid waste generated at FLW is primarily municipal waste, special waste and demolition debris. Disposal of municipal and construction/demolition wastes from FLW is conducted as required by the State of Missouri. FLW participates in the Ozark Rivers Solid Waste Management District which includes the counties of Pulaski, Gasconade, Crawford, Maries, Phelps and Dent. Although the Solid Waste Management Plan for the district was approved in February, 1994, a regional landfill has not been established. A private contractor collects and transports municipal waste from FLW to a transfer facility in St. Robert for disposal in a landfill in Hartville, Missouri. Hartville is located approximately 40 miles south of FLW in Wright County.

Domestic wastewater sludge produced on FLW is disposed, by permit, through land applications at several locations on the installation. There are approximately 20 locations where this has occurred. The 3.5 to 4.5 percent solid sludge is applied to the land in liquid form. The remaining sludge is dried at FLW and used as compost, in degraded areas and borrow pits, and as a soil conditioner for fire-break grasses. Sludge-spreading equipment, with semi-floatation tires, is used to minimize surface disturbance at the disposal sites.

**4.7.2.2 Landfills.** A Resource Conservation and Recovery Act (RCRA) Facility Assessment (B&VWST, 1992) identified 21 landfills that have been used for the disposal of solid waste at FLW over the course of its history. These landfills were identified for investigation under the Installation Restoration Program and are discussed further in subsection 4.8.1. There are no landfills currently in operation at FLW. The last two landfills to cease operation included: a sanitary landfill which stopped receiving wastes in 1993 when it had approximately 9 acres of fill remaining, and a 27-acre demolition debris landfill which stopped receiving wastes in 1994. FLW is awaiting final closure approval for both of these landfills. Currently, a private contractor collects and transports demolition solid waste from FLW and disposes of the material in a landfill in Hartville, Missouri as discussed in subsection 4.7.2.1 above.

**4.7.2.3 Recycling.** A curbside recycling program that collects aluminum, glass, paper, plastic and steel has been instituted in all housing areas. The program is managed by a private contractor. FLW also has a paper and cardboard recycling program which involves approximately 250,000 pounds of paper per year. Yard wastes from the installation are processed at the compost facility at FLW.

**4.7.2.4 Other Regulated Wastes.** The handling and disposal of other regulated wastes including hazardous wastes, radiological wastes, and medical wastes are discussed in subsection 4.8. Hazardous wastes are discussed in detail in subsection 4.8.1; radiological wastes are discussed in detail in subsection 4.8.8; and medical wastes are discussed in detail in subsection 4.8.9.

### 4.7.3 Transportation System

**4.7.3.1 Highways and Roads.** Primary access to FLW is provided by Business Spur I-44 (Missouri Avenue), a four-lane divided arterial roadway which provides direct connection from the Sverdrup (north main) Gate to I-44, located approximately two miles north of the installation. More than 83 percent of the off-post personnel use the Sverdrup Gate for daily entrance to and exit from the installation. When this road enters FLW, it is designated as FLW 1 and is part of the installation and not a county or state route. Various secondary roads provide access to the installation from the south, west and east. State Highway AW (Route 1) provides direct access to the south entrance of the installation. County Road H, which connects to State Highway 17, provides access to the installation from the west, while Highway J provides access from the east. Based on studies funded by the Missouri Highway and Transportation Department (MHTD), average daily traffic (ADT) volume on I-44 between the I-44 Loop and Highway H exits in 1993 was 25,708 vehicles (MHTD, 1994). Figure 4.7 is an illustration of the cantonment roadway system.

Off-post roadway improvements recently completed or underway include widening and resurfacing by the MHTD to a two-mile segment of Business Spur I-44 between State Highway 17 and I-44 in Waynesville; and the construction of a concrete low water crossing over Roubidoux Creek on FLW 8. Improvements programmed for the next several years within the vicinity of FLW include the resurfacing of segments of I-44 and replacement of several bridges.

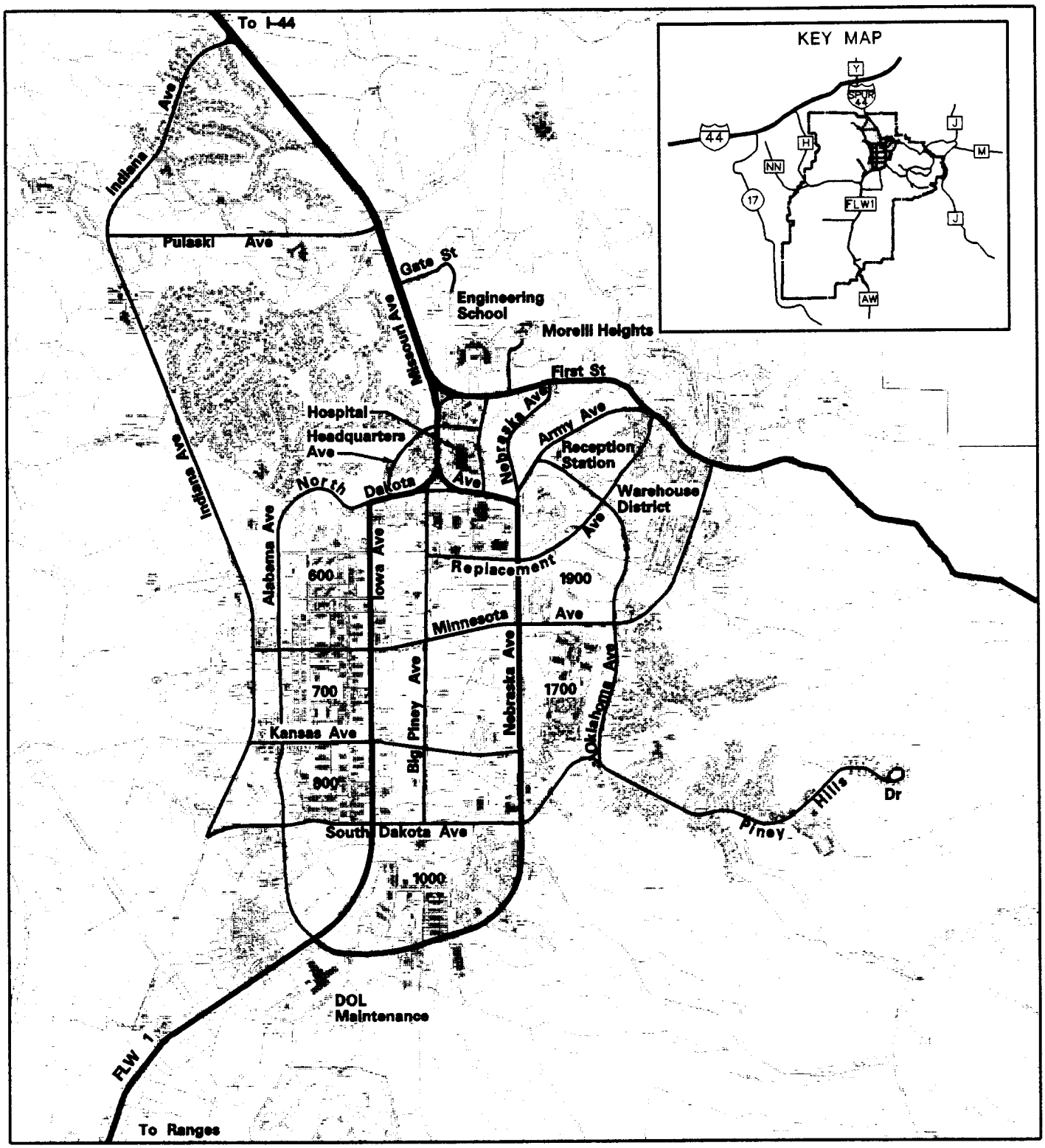
The FLW installation (including USFS lands within FLW boundaries) contains over 284 miles of roads, which include 100 miles of paved road; 55 miles of loose surface roads; and 129 miles of improved and unimproved dirt roads. The paved roads have a bituminous surface and are in generally good condition. The loose surface and dirt roads are located in the training and range areas outside of the cantonment area. In accordance with definitions in TM 5-822-2, roadways within the cantonment are classified as primary, secondary or tertiary based on 1985 traffic counts prepared for the *Traffic Engineering Study, FLW, Missouri* (MTMC, 1985).

All roadways within the cantonment are paved and two lanes wide, with the exception of Missouri Avenue which is four lanes wide with a dividing median beginning north of its intersection with First Street. Traffic flow within the cantonment is predominantly north/south along the primary roadways of Missouri Avenue, Iowa Avenue and Nebraska Avenue. Major east/west primary roadways include First Street and North Dakota Avenue.

Existing traffic conditions at FLW were evaluated by the Military Traffic Management Command Transportation Engineering Agency (MTMCTEA). MTMCTEA conducted traffic counts on major roads on the installation during October 1995 and February 1996. In addition, MTMCTEA conducted turning movement counts at major intersections on the installation during October 1995. These traffic counts and the results of this study are documented in MTMCTEA Report INH 95-23 *BRAC Impact Analysis of Military Police and Chemical Schools Realignment* (MTMC, 1996).

Existing traffic counts are generally low for most roads on the installation. Missouri Avenue has the highest traffic volume at approximately 24,000 vehicles per day. A minor constraint to traffic movement occurs at some of the major intersections. This is typical of most traffic networks because intersections need twice as many lanes as roads to handle through traffic movements and turning movements. A measure of the ability of a road or intersection to handle traffic is described as its level-of-service (LOS).

LOS is a qualitative measure which describes the operational conditions of a road or intersection, and the perception of the operational conditions by motorists. LOS describes these conditions in terms of speed and travel time, freedom to maneuver, traffic interruptions, intersection delay, comfort and convenience, and safety. Six LOSs are defined with letter designations of A through F. Level-of-service A represents the best operating conditions and F represents the worst. Most roads and intersections are designed to operate at LOS C during normal operating conditions and LOS D during peak periods. LOS E represents the capacity of a roadway or intersection. Definitions of the various levels-of-service were adapted from the *1985 Highway Capacity Manual* (TRB, 1985). These levels-of-service are described in Table 4.10 and are used to evaluate traffic impacts. Existing levels-of-service are shown in Table 4.11.




Legend

Primary

Secondary

Tertiary

N

0 3000 6000

Scale in Feet

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**EXISTING ROAD NETWORK**

DATE: **MARCH, 1997** FIGURE NO. **4.7**

**Table 4.10:**
**Highway Level-of-Service Definitions**

| Levels of Service | Signalized Intersections | Unsignalized Intersections | Arterial Streets |
|---|---|---|---|
| A | Very low delay, less than five seconds per vehicle. Intersection approach appears quite open, turning movements are easily made and no vehicle wait longer than one red indication. Approach volumes are generally less than 60% of capacity. | Reserve capacity exceeds 400 vehicles per hour. Minor street traffic experiences little or no delay. | Primarily free flow operations at average travel speeds (usually about 90 % of free flow speed). Vehicles are unimpeded in their ability to maneuver within the traffic stream. |
| B | Delay is in the range of 5.1 to 15.0 seconds per vehicle. An occasional approach phase is fully utilized and a substantial number of phases are approaching full use. Approach volumes generally range from 60% to 70% of capacity. | Minor street approaches have reserve capacity of 300-399 vehicles per hour and experience only short traffic delays. | Represents reasonably unimpeded operations at average travel speeds (usually about 70% of the free flow speed). Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. |
| C | Delay is in the range of 15.1 to 25.0 seconds per vehicle. Individual cycle failures may begin to appear at this level and the number of vehicles stopping is significant, although many still pass through the intersection without stopping. Back-ups may develop behind turning vehicles and approach volumes range from 70% to 80% of capacity. | Minor street approaches have reserve capacity of 200-299 vehicles per hour. Traffic delays are of average duration. | Represents stable operations. However, ability to maneuver and change lanes in mid-block locations may be restricted. Average travel speeds lower to 50% of the average free flow speed. |
| D | Delay is in the range of 25.1 to 40.0 seconds per vehicle. The influence of congestion becomes more noticeable. Many vehicles stop and the proportion of vehicles not stopping declines while individual cycle failures are noticeable. Approach volumes generally range from 80% to 90% of capacity. | Reserve capacity is limited to 100-199 vehicles per hour. Delays to minor street traffic increase substantially. | Borders on a range in which small increases in flow may cause substantial increases in approach delay and, hence, decreases average travel speeds to about 40% of the free flow speed. |
| E | Delay is in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. Individual cycle failures are frequent occurrences as approaches to intersections are continually backed up. Approach volumes are within 10% of capacity. | Reserve capacity of approaches fall below 100 vehicles per hour while traffic delays on the minor street become extremely long. | Characterized by significant approach delays and average travel speed of one-third the free flow speed or lower. |
| F | Describes operations with delay in excess of 60.0 seconds per vehicle, which is considered unacceptable to most drivers. This condition often occurs with over saturation or when the arrival flow rates exceed the capacity of the intersection. | Traffic demand exceeds the capacity of the approach and extreme delays are encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This conditions warrants improvement to the intersection. | Characterizes arterial flow at extremely low speeds below one-third to one-quarter of the free flow speed. Intersection congestion is likely at critical signalized locations with high approach delays resulting. |

*Source: 1985 Highway Capacity Manual*

The majority of the roadways within the heaviest trafficked areas of FLW have LOSs ranging from "A" to "C". The overall intersection rating were "C" or better for every intersection except those listed on Table 4.11. High turning movements at these major intersections within the main cantonment cause the LOS to deteriorate to a range of "D"-"F" during peak hours.

**Table 4.11:**
**1996 Level-of-Service for Key Intersections at Fort Leonard Wood**

| Intersection | AM LOS | Noon LOS | PM LOS |
|---|---|---|---|
| Missouri Ave @ Headquarters Ave | B | B | F [1] |
| Missouri Ave @ Indiana Ave | A | A | A |
| Missouri Ave @ Pulaski Ave | C | A | A |
| Missouri Ave @ Gate St | F | C | A [2] |
| Nebraska Ave (Morelli Heights) @ First Street | A | A | A |

Note: 1 The intersection has a LOS of E for westbound, F for northbound, and over capacity for both eastbound and the overall intersection.
2 Gate Street is a two lane, two-way local road that serves a sports complex that is seldom used on a regular basis. A stop sign controls the traffic on Gate Street.

*Source: Military Traffic Management Command, May 1996*

**4.7.3.2 Railroads.** Rail service is provided by a government-owned railroad constructed in conjunction with the establishment of the installation in 1940-41. Within the reservation boundary the rail system is operated by the Transportation Division, Directorate of Logistics. The rail system consists of 27.84 miles of track, comprising a main line with 22 spurs and sidings of which 18 are located in the industrial section of the northeast corner of the installation. Of the above total track mileage, 19.85 miles connect the on-installation track (eight miles) to the Burlington Northern main line at Bundy Junction west of Rolla.

**4.7.3.3 Airports.** Forney AAF is a Class A airfield located on the southwest perimeter of the cantonment area adjacent to Iowa Avenue. The airport has a single, instrumented asphalt surface runway which is 150 feet wide and 5,018 feet long with a 500-foot overrun at each end of the runway. The northwest/southeast oriented runway cannot accommodate heavy-lift aircraft. Navigational and landing aids are available, in addition to an approach lighting system and runway end identifier lights. Facilities available include a taxiway, parking apron, operations building and control tower, small maintenance hangar, weather station, and a crash-and-rescue fire station. Scheduled passenger air service is available via Trans World Express which operates a passenger terminal for its two daily flights five days per week with connections to major airlines at St. Louis.

The *Military/Civilian Joint Use Feasibility Study for Forney Army Airfield* (SP, 1993) recently concluded that the establishment of a civilian Fixed Based Operator (FBO) and joint civilian/military use of the airport would not jeopardize or interfere with military operations on FLW and Forney AAF. The City of Waynesville, which is the local sponsor of the study, is interested in the establishment of an FBO to serve the local community. It is proposed that a five-acre tract of land on the airfield be used for this purpose through a lease arrangement between the Army and the City of Waynesville. A separate environmental assessment has been prepared for this action. A Joint Use and Lease Agreement between the Department of the Army and the City of Waynesville has been reviewed by the Aviation Section of the MHTD, with suggested MHTD modifications and final terms of the agreement still to be negotiated between the participating parties. A layout of the leased area and cost assessment will be completed subsequent to finalization and formal acceptance of the lease agreement.

Another small airfield, Babb Airfield, is located southwest of Forney AAF north of Range 36. This airfield consists only of an unpaved 1,200-foot assault strip, and is not FAA approved for serving air traffic. Use of this airfield is limited to military helicopter operations.

Airports with scheduled commercial service in the region include Columbia Regional (north of Jefferson City) and Springfield Regional. Rolla National Airport, 32 miles east of the installation, has two paved runways each 5,500 feet long. Whiteman Air Force Base, an Air Combat Command installation near Sedalia, is the designated mobilization aerial port of embarkation for Army units at FLW.

## 4.8 HAZARDOUS AND TOXIC MATERIALS

FLW maintains programs to minimize and prevent damage to the environment from use of hazardous materials. The programs include: the Fort Leonard Wood Spill Prevention and Response Plan (SPRP) (Radian, 1994) which identifies measures for preventing and responding to spills of POLs, hazardous materials, and hazardous wastes; the Hazardous Waste Minimization Plan with the objective of reducing quantity and toxicity of wastes generated at FLW; and development of a Pollution Prevention Plan with the goal of reducing the impacts of post operations on the environment. The Hazardous Waste Management Plan provides guidance and assigns responsibility for the safe and proper methods for handling, storing, and disposing hazardous wastes at FLW. The post has developed action plans for removing or reducing hazards associated with polychlorinated biphenyls (PCBs), chlorinated fluorocarbons/halon, lead paint, asbestos and radon. FLW has standard operating procedures (SOPs) for working with hazardous and toxic materials which prevent or minimize the potential threat to human health and the environment.

### 4.8.1 Hazardous Waste Management

The Installation Hazardous Waste Management Plan (FLW, 1991a) directs management of hazardous waste at FLW. The plan establishes procedures and policies, and assigns responsibilities associated with the generation, handling, management and disposition of hazardous waste at FLW. The policies and procedures outlined in the plan are authorized by the Resource Conservation and Recovery Act (RCRA) of 1976, the Missouri Hazardous Waste Management Law (MDNR, 1986a and 1986b) as amended, Army Regulations 420-47, AR 420-76, AR 200-1, and other applicable Federal, state and local regulations. The Environmental Division of the FLW DPW provides initial and annual refresher training to representatives of various units operating at FLW that generate hazardous wastes. The training includes specific instruction on the proper procedures for identification, handling, transport, and turn-in of hazardous wastes.

Fort Leonard Wood is a regulated large quantity generator and monitored by the MDNR, under the authority of the Missouri Hazardous Waste Management Law and RCRA. The FLW generator Identification number is MO 3213720979, and FLW has attained interim status under RCRA, as a Treatment, Storage, Disposal (TSD) facility and as required by Federal/state regulation, and will conduct environmental remedial clean up as required. Fort Leonard Wood has developed recycling/minimization efforts to reduce the quantity of waste generated. Items such as waste fuel, waste oil, paint waste and solvents are recycled off-site. Sulfuric acid is neutralized on-site by a neutralization/filtration process. Instead of disposing lead contaminated sand, it is used by a smelter facility as raw material. Silver is reclaimed from photographic waste. In March of 1996, remaining PCB transformers were retrofitted and reclassified to non-PCB.

Routinely generated hazardous waste streams generated at FLW include those materials listed on Table 4.12. Table 4.13 provides a listing of infrequently generated hazardous waste.

**Table 4.12:**
**Routinely Generated Hazardous Waste[1]**

| | | |
|---|---|---|
| Waste Oil | Medical Waste | Dry Cleaning Solvent |
| Xylene | Furniture Repair Waste | Glass Bead Blaster |
| Mercury Batteries | Ignitable Waste | Cleaning Solvent |
| Print Plant Solvent | Photographic Waste | Paint Solvent |
| Super Tropical Bleach (STB) Calcium Hypochlorite | | |

Note: 1 Including expired shelf-life items.

*Source: Fort Leonard Wood, Directorate of Public Works*

| Table 4.13: Infrequently Generated Hazardous Waste (1 to 2 times per year or less)[1] | | |
|---|---|---|
| Waste Fuel | Waste Magnesium Batteries | Corrosive Decontaminating Solution (DS-2) |
| Lithium Batteries | Oxidizer | Reactive Waste |
| Corrosive Waste | Toxic Waste | Chemical Defense Equipment Kits |
| Paint Chips | Lead Contaminated Sand | Mercuric Cyanide (M256A1 kit) |
| Note: 1 Including expired shelf-life items. | | |
| *Source: Fort Leonard Wood, Directorate of Public Works* | | |

Units operating at FLW that routinely generate hazardous wastes are classified as continuous generators of hazardous wastes and are authorized to accumulate in a single 55-gallon container or for a duration of up to one year from the date of initial accumulation, which ever occurs first. Once one of these thresholds has been met, the unit has 72 hours to contact the Environmental Division and relocate the hazardous waste to the Hazardous Waste Accumulation Building (Building 2229). Units that generate hazardous wastes intermittently, contact the Environmental Division immediately to arrange turn-in of the hazardous waste at Building 2229.

The Hazardous Waste Accumulation Building is operated by the Environmental Division of the DPW. The on-post generator is responsible for meeting the following requirements prior to turning in the hazardous wastes: obtain appropriate Material Safety Data Sheet(s), complete a waste profile form, complete a turn-in document (DA Form 2765-1), initiate a disposal requisition (DD Form 1348-1), and package the hazardous waste in an approved DOT hazardous material container. Hazardous wastes accompanied by these requirements are received at Building 2229 each Monday, Wednesday, and Friday between 0700 and 1130. Receipt of each hazardous waste is recorded in a logbook. Hazardous wastes brought to Building 2229 must be transported off-post for reuse, treatment or disposal within 90 days after arrival.

Building 2229 was designed and constructed specifically for the purpose of hazardous waste accumulation. The building layout includes three bays used to segregate toxic wastes and corrosive wastes. Features of the building include heat, telephone, alarm system, explosion proof lighting and electrical fixtures, secondary spill containment, personal protective equipment, spill response materials, and impervious epoxy coating on the floor and walls. A portable structure also containing three bays is located outside Building 2229 for accumulating flammable wastes. The portable structure is equipped with explosion proof lighting and electrical fixtures, secondary spill containment, and epoxy coating on the floor and walls. Use of the Hazardous Waste Accumulation Building rarely has reached 50-percent of the available storage capacity.

The Environmental Division of the DPW maintains an inventory of all hazardous materials received at Building 2229 and monitors the storage duration. On the same day hazardous wastes are received, the Environmental Division transfers the responsibility for arranging disposal to the Defense Reutilization and Marketing Office (DRMO) using the DD Form 1348-1 initiated by the generator.

Defense Reutilization and Marketing Office arranges disposal of the hazardous wastes by a private vendor using a contract administered by DRMO. The current contract was issued 5 May 1995 with a base year and 2 option years (DRMS, 1995). In addition to FLW, the current contract also covers hazardous waste disposal requirements for Whiteman AFB in Missouri, Scott AFB in Illinois, and numerous National Guard and Reserve sites in the two state region. Pick-up is currently arranged by DRMO when a combined total of 2,000 pounds of hazardous wastes have accumulated among the various locations or before a waste has been stored 90 days, whichever occurs first. The contractor is obligated to pick up the hazardous wastes from the accumulation sites within 30 days of receiving a contract delivery order from DRMO. A representative from DRMO accompanies the contractor at the accumulation sites to verify that contracted hazardous wastes have been transferred to the contractor's possession. A manifest is initiated that will track the wastes until disposal. A map of the transportation route is not currently required by the contract. The hazardous wastes are disposed off the installation at permitted hazardous waste management facilities in accordance with all local, state, and Federal laws and regulations, and the terms and

conditions of the contract. A list of pre-approved treatment, storage, disposal (TSD) facilities across the continental United States is contained in the contract. Within one year of disposal, the contractor is required to provide FLW a certificate of disposal that identifies the final fate of each hazardous waste.

Fort Leonard Wood generates and arranges for disposal of various special wastes. Special wastes currently contracted for disposal include hospital incinerator ash, latex paint, creosate poles, specific types of pharmaceuticals, discharged/deactivated batteries, and dry chemical fire extinguishers. The DRMO contract has provisions for the disposal of non-RCRA, non-State regulated wastes which could be expanded by contract modification to include Special Wastes.

In 1981, FLW applied for a RCRA Part A interim status for a storage facility and a land treatment unit (Range 36, Open Burn/Open Detonation (OB/OD) site). In 1988, FLW applied for a Part B permit for a conforming storage facility and a miscellaneous treatment unit for Range 36 OB/OD. The permit has not yet been granted, and the Army is considering withdrawing the permit application. The miscellaneous treatment unit was operated by the 63rd Explosive Ordnance Detachment (EOD) but is no longer used for treatment but is used for training. Fort Leonard Wood has been granted their Part A permit and granted an interim status on their Part B permit. A closure plan is currently being prepared for the Range 36 OB/OD site for review by MDNR.

Soil samples collected at the open burn pit of the EOD site were analyzed for total petroleum hydrocarbons, volatile aromatics, explosives and metals. Soil samples collected at other surface locations were tested for explosives and metals, and four monitoring wells were sampled and analyzed for volatile aromatics, total petroleum hydrocarbons, explosive compounds, nitrate/nitrite and RCRA metals. All test results were below RCRA limits.

In the past, RCRA wastes were temporarily stored at three interim container storage areas: the Float Yard Storage Area, Furniture Repair Shop Satellite Storage Area, and in the Building 2563 storage area. A draft closure plan for each of these areas was prepared in 1992 and a RCRA investigation of each site was completed in 1993 (Radian, 1992 and 1993). The investigation did not recommend further action at any of these sites.

The USEPA completed a RCRA Facility Assessment (RFA) for FLW in 1992 (B&VWST, 1992). The purpose of the report was to identify releases or potential releases which may require further investigation. A total of 52 Solid Waste Management Units (SWMU) and two Areas of Concern (AOC) were identified. As part of the Installation Restoration Program, FLW addresses the status and plans for SWMUs in the Installation Action Plan (IAP) which is updated annually. The current IAP (FLW, 1996j), lists 68 sites of which 57 have been identified as requiring no further action. These SWMUs consisted, in part, of 19 closed and two open landfills, wastewater lagoons, selected storage areas, and selected training areas. Further investigation was recommended at several of the SWMUs. These areas include:

- a pesticide storage building,
- an old OB/OD Area,
- the Cannon Range Air National Guard Open Burn and Burial Site,
- the DPW Salvage Yard,
- an ammunition box storage site,
- six closed landfills, and
- an old fire training areas.

Through the Installation Restoration Program, FLW is preparing an Installation Action Plan (IAP). This IAP will identify corrective actions for these sites.

### 4.8.2 Polychlorinated Biphenyls (PCB)

Guidance for PCB management at FLW comes from the 1989 TRADOC PCB Policy. FLW is currently in the process of replacing PCB and PCB-contaminated transformers. All pole-mounted transformers at FLW have been tested for PCBs. A total of 126 of the 1,300 transformers tested were found to be

PCB-contaminated or contain PCB, and these were replaced in 1993. Pad-mounted transformers and transformers located in electrical vaults included 57 PCB-contaminated or PCB transformers. All 57 pad transformers have been retrofitted and reclassified to a non-PCB status. Another FLW program is in place to replace these old pad transformers by the end of 1996, rendering the FLW PCB transformer free. When PCB transformers, PCBs and other PCB items are removed from service, the DRMO arranges for off-post disposal by the use of a permitted transport and disposal contractor.

### 4.8.3 Petroleum, Oil and Lubricants (POL)

Waste oil is accumulated in three 5,000 gallon storage tanks, which are located within Facility 2581. Waste oil is removed from the installation by a licensed contractor. The Installation Spill Prevention and Response Plan (Radian, 1994) combines guidance regarding measures for spill prevention and control, with guidance concerning containment, reporting and clean-up of accidental spills or releases of oil, hazardous materials, and hazardous waste into the environment.

Underground storage tanks (USTs) at FLW are operated in accordance with the FLW Standard Operating Procedures for Underground Storage Tanks (FLW, 1990c). Regulated underground tanks at FLW are used to hold gasoline, jet fuel, diesel fuel, and used oil. Only 23 regulated USTs remain at FLW, and they have all the necessary upgrades for compliance with 1998 standards. All heating oil tanks have been removed from family housing areas as a result of conversion to natural gas heating. Unregulated tanks at FLW are those used to store heating oil at specific buildings. Within the cantonment area, 281 non-regulated tanks remain. FLW has also adopted a policy that non-regulated tanks are to be removed as facilities are converted to alternate heat. Removal of regulated USTs is monitored by the MDNR. At the present time there are no known leaking underground storage tanks at FLW. If any are identified in the future, FLW will follow established corrective action procedures.

### 4.8.4 Asbestos

Asbestos management at FLW is accomplished according to the TRADOC Asbestos Management Control Handbook (TRADOC, 1985) and the Department of the Army Technical Manual TM 5-613 which provides guidance on identification and control measures for asbestos containing materials (ACMs). The FLW asbestos program consists of identification, monitoring, determination of health hazards, awareness education, removal and disposal of asbestos. Work is accomplished by qualified in-house staff or by contract. All areas of concern in family housing and other post buildings constructed pre-1975 have been surveyed for asbestos. Family housing units were found to contain some ACMs such as linoleum, asbestos fabric expansion joints, and insulation around furnace flues. Asbestos was recently identified in the floor tile, floor covering and wallboard within Buildings 2510 and 2516, two warehouse style buildings constructed in the early 1940s (Woodward-Clyde, 1996). Buildings built since 1975 should not contain friable ACM, but may contain Category 2 non-friable ACM which could become friable upon demolition. Category 2 non-friable ACM is regulated under national emission standards for hazardous air pollutants (NESHAPS). Asbestos removal is generally completed in conjunction with demolition activities, but may also be performed when needed due to deteriorated conditions or to accomplish other maintenance. Asbestos is disposed in accordance with applicable Federal, state and Army regulations.

### 4.8.5 Pest Management

The FLW Pest Management Plan (FLW, 1994g), describes the installation's pest management requirements and the resources necessary for pest control. Both chemical and nonchemical control techniques are stressed in the plan. The installation utilizes certified contractors to handle, mix and apply pesticides across the installation except for at the golf course. Pest management on the golf course is accomplished by Department of Defense personnel who are certified pest control operators. Chemicals used by contract operations are stored in Building 2273 and chemicals used on the golf course are stored in Building 10202. Contained mixing facilities are provided at both of these buildings. The contractor is responsible for disposal of wastes generated while completing the contracted activities. The only wastes generated by the pesticide operations at FLW are empty pesticide containers which are triple-rinsed and

taken to the landfill in Hartville, Missouri. The rinse water is used as a diluent for the next batch of pesticide. Materials with an expired shelf-life are turned over to DRMO for off-post disposal.

### 4.8.6 Lead Paint

The FLW lead paint program consists of identification, monitoring, determination of health hazards, awareness education, removal and disposal of lead paint. FLW has conducted a random sampling of the housing areas to determine the extent of potential problems associated with lead paint. As renovations are made, the components are checked for lead paint. If lead-based paint is found, the component is replaced. Lead-based paint was recently identified on the interior and exterior walls of Buildings 2510 and 2516, two warehouse style buildings constructed in the early 1940s (Woodward-Clyde, 1996). Work is accomplished by qualified in-house staff or by contract.

### 4.8.7 Radon

The FLW radon program consists of screening, monitoring, determination of health hazards and awareness education. FLW has completed screening of facilities in accordance with the 1988 TRADOC directive. There were 258 buildings with initial readings exceeding 4 picocuries (pCi), which is the USEPA action level. The highest readings from the family housing area was 14.6 pCi. Monitoring of buildings which exceeded the established 4 pCi level is currently underway, and remediation action (if any) will be determined based upon the completion of the monitoring. The current monitoring will be completed in the Fall of 1997.

### 4.8.8 Radioactive Materials/Waste

Low-level radioactive materials/waste are managed under the control of two operations at FLW. Radioactive wastes may be generated by materials used at the hospital, materials used to calibrate field equipment, or materials from consumer goods (smoke detectors) or surplus equipment (luminescent dials). The radioactive materials used at the installation are packaged by the suppliers in accordance with U.S. Department of Transportation (DOT) requirements and shipped by conventional trucking and express services.

Approximately 95 percent of the hospital radioactive waste materials have a half-life of 3 days or less. The remaining hospital radioactive wastes have a half-life of less than 60 days. The wastes are stored at the hospital in the Nuclear Medicine Department radioactive waste and decay room for a minimum period of 10 half-lives and until their radioactivity can no longer be distinguished from background. When a waste meets these conditions, it is incinerated in the hospital incinerator in the same manner as biohazardous wastes. The procedures and practices for the management and disposal of radioactive wastes by the FLW Hospital are licensed under the NRC (License Number 24-15095-01) and the Department of the Army Radioactive Materials Authorization (Authorization Number 24-01-96).

Certain hospital and Army field equipment use small amounts of sealed low-level radioactive sources to calibrate instruments. Other equipment also contain small amounts of low-level radioactive materials in component parts, such as smoke detectors, luminescent dials, and electronics. The Army is very concerned about these materials and has a program to remove and properly dispose of even these small conventional quantities of radioactive material.

Low-level radioactive wastes from these sources are processed through DRMO and the installation Radiation Protection Officer (RPO) following established disposal procedures. When a person or unit has radioactive material to dispose, contact is first made with DRMO; the RPO is then notified to remove the radioactive component. A representative of the RPO is sent to collect the material to be disposed, double bag and label the items, and transfer them to a secure collection point. The radioactive materials are accumulated in an isolated room in Building 5265 having controlled access. Currently every 6 to 12 months, the accumulated radioactive material is picked up for disposal by a permitted contractor.

The contract for the pickup, transport and disposal of the low-level radioactive material is administered by the Radioactive Waste Disposal Division of the Industrial Operations Command (IOC). When the radioactive material is picked up, the IOC arranges for a certified broker to be present who is specifically trained to ensure that the materials are inspected, packaged and manifested in accordance with DOT requirements. The contracted waste hauler is not required to notify the public of the transportation route. The IOC has contingency plans and contracts for emergency response in the event of a spill or release of radioactive material enroute to disposal. The contractor transports the materials to the Barnwell Low-Level Radioactive Waste Disposal Facility in Barnwell, SC. The materials are consolidated prior to being sealed and deposited in a specially designed, sealed, concrete vault. The disposal site is a licensed low-level radioactive waste disposal facility owned by the State of South Carolina. It is continuously monitored for leakage.

### 4.8.9 Regulated Medical Waste

Guidance for the collection, handling and disposal of Regulated Medical Waste (RMW) at FLW is contained in the USA MEDDAC Pamphlet 40-24 (USA MEDDAC, 1992) and its subsequent revisions. RMW is currently generated at the General Leonard Wood Army Community Hospital, dental clinics, and other small on-post medical and dental activities. The RMW generated at the General Leonard Wood Army Community Hospital is disposed on-site in an incinerator. Storage of RMW at the hospital does not exceed five days.

The incinerator used to dispose of RMW generated at the FLW Community Hospital has been in operation since 1983. The incinerator is fueled by propane gas and is operated an average of three days per week. The ash is not considered hazardous and is disposed as a solid waste. The incinerator operates under the conditions established in MDNR Permit No. 0278-008.

Bags of RMW from outlying medical and dental buildings within the health service area will be collected daily (twice weekly at a minimum), placed in a rigid container, and stored in a secure area. A waiver has been received from Medical Command to allow storage of RMW at on-post medical activities for up to 10 days. Pick-up and disposal of RMW at outlying medical facilities is accomplished by a licensed waste hauler under contract with USA MEDDAC. The FLW Community Hospital Safety Manager is given a manifest of the RMW picked up by the contractor to track its handling until disposal.

## 4.9 MUNITIONS

Munitions are used as a part of routine weapons familiarization and weapons qualification training at FLW. This training is accomplished for both Active and Reserve personnel, from all branches of service. Table 4.14 provides a listing of the approximate annual ammunition usage at FLW prior to implementation of the proposed BRAC action. Training on weapons familiarization and qualification ranges is conducted under the guidance and supervision of qualified Range Control and Range Safety personnel, and in accordance with FLW Regulation 210-14, *Ranges and Training Areas* (FLW, 1993a). Footnotes for Table 4.14 appear at the end of the table on page 4-44.

**Table 4.14:**
**Ammunition Usage at Fort Leonard Wood[1]**

| Type of Ammunition or Explosive | Army Class | Quantity Currently Used at FLW [2] | Remarks |
|---|---|---|---|
| **Ammunition** | | | |
| 12 gauge shotgun | A011 | 538 | |
| 5.56 mm ball | A059 | 0 | |
| 5.56 mm tracer | M063 | 0 | |
| 5.56 mm ball | A071 | 10,095,213 | for M16A1/M16A2 |
| 5.56 mm blank | A080 | 1,677,717 | for M16A1/M16A2 |

**Table 4.14:**
**Ammunition Usage at Fort Leonard Wood[1]**

| Type of Ammunition or Explosive | Army Class | Quantity Currently Used at FLW [2] | Remarks |
|---|---|---|---|
| 5.56 ball tracer rounds | A068 | 429,248 | for M16A1/M16A2 |
| 7.62 mm blank linked | A111 | 163,961 | for M60/M240 training |
| 7.62 mm ball linked (4 ball plus 1 tracer round) | A131 | 958,082 | |
| 7.62 mm ball | A136 | 2,010 | |
| 7.62 mm ball linked for machine gun | A143 | 29,355 | for M60 |
| 7.62 mm 4 ball | A151 | 164,680 | |
| 0.30 mm ball | A212 | 429 | |
| 9 mm practice AT-4 | A358 | 84,524 | for AT-4 |
| 9 mm ball pistol | A363 | 73,537 | |
| 0.38 caliber blank (sentry dog) | A403 | 0 | |
| 0.50 caliber ball 1 tracer | A520 | 40,625 | |
| 0.50 caliber cartridge chamber ball machine gun | A552 | 10 | |
| 0.50 caliber ball | A555 | 200 | |
| 0.50 caliber (4 ball with 1 tracer round) | A557 | 27,044 | |
| 0.50 caliber blank for machine gun | A598 | 5,350 | |
| 0.50 caliber plastic | A602 | 24 | |
| 40 mm practice M781 | B519 | 27,502 | |
| 40 mm high explosive duel purpose low pressure | B546 | 21,024 | |
| 40 mm high explosive | B571 | 0 | |
| 40 mm training practice M918 | B584 | 13,608 | |
| 40 mm sub-caliber for Combat Engineer Vehicle | B592 | 162 | |
| Cartage 84 mm M136 AT-4 and launcher | C995 | 134 | |
| 165 mm training practice M623 | D590 | 360 | |
| **Smoke Grenades and Explosives** | | | |
| Grenade smoke screening | G815 | 0 | |
| Grenade & launcher smoke | G826 | 0 | |
| Fuze hand grenade, practice | G878 | 251,988 | |
| Grenade hand fragmentation M67 | G881 | 36,531 | |
| Grenade hand incendiary | G900 | 121 | |
| Grenade hand smoke, HC | G930 | 1,612[3] | Uses HC, will be phased out of use by FY 99 and replaced by the M83 which uses terephthalic acid |
| Grenade hand smoke, TPA, M83 | M83 | 0[3] | Replacement for the G930 which used HC |
| Grenade hand smoke, Green (MILES) | G940 | 467 | |
| Grenade hand smoke, Yellow | G945 | 623 | |
| Grenade hand smoke, Red | G950 | 311 | |
| Grenade hand smoke, Violet | G955 | 585 | |
| Grenade hand riot, CS (Tear) | G963 | 730 | |
| Green smoke M82 | G978 | 0 | Infrared obscurant (TI02) |
| Motor rocket 5 inch | J143 | 7 | |
| Actual anti-tank mine | K002 | 124 | |
| Burster incendiary field M4 | K010 | 0 | |

**Table 4.14:**
**Ammunition Usage at Fort Leonard Wood[1]**

| Type of Ammunition or Explosive | Army Class | Quantity Currently Used at FLW [2] | Remarks |
|---|---|---|---|
| Canister mine practice volcano | K042 | 10 | |
| Fuze mine combination M605 | K058 | 108 | |
| Mine anti-personnel M16A1 with fuze | K092 | 18 | |
| Mine anti-personnel directional M1 (claymore) | K143 | 195 | |
| Mine anti-tank high explosive M15 with fuze | K180 | 18 | |
| Mine anti-tank M21 with fuze M607 | K181 | 18 | |
| Mine AT high explosive M19 with fuze | K250 | 18 | |
| Riot control Agent, CS (Tear) capsule | K765 | 2,650 | |
| Smoke pot M5 Grenade, HC | K866 | 110 [3] | Uses HC, will be phased out of use by FY 99 and replaced by the K868 which uses terephthalic acid |
| Smoke pot M8, TPA | K868 | 0 [3] | Replacement for the K866 which used HC |
| Thickening Compound - (quantity of 40 ounce cans used) | K917 | 111 | |
| Signal illumination green star parachute M1 | L305 | 19 | |
| Signal illumination red star cluster | L306 | 46 | |
| Signal illumination white star cluster | L307 | 344 | |
| Signal illumination red star parachute | L311 | 44 | |
| Signal illumination white star parachute | L312 | 3,918 | |
| Signal illumination green star | L314 | 119 | |
| ATWESS (MILES) | L367 | 27 | laser for TOW and Dragon weapons systems simulators |
| Flare surface trip | L495 | 433 | |
| Illumination projectile ground burst | L594 | 3,360 | |
| Simulated projectile air burst | L595 | 0 | |
| Simulated booby trap | L598 | 1,428 | |
| Simulated booby trap, illuminated | L599 | 518 | |
| Simulated booby trap, whistle | L600 | 319 | |
| Simulated hand grenade | L601 | 2,304 | |
| Charge demolition C4, 1¼ pound | M023 | 12,361 | |
| Charge demolition block (four ½ pound sheet) | M024 | 18 | |
| Demolition kit banglore torpedo | M028 | 64 | |
| Charge demolition TNT ¼ pound | M030 | 18,877 | |
| Charge demolition TNT 1 pound | M032 | 0 | |
| Charge demolition 40 pound | M039 | 327 | |
| Cap blasting electric M6 | M130 | 10,272 | |
| Cap blasting non-electric M7 | M131 | 13,383 | |
| Cartage, Impulse | M174 | 34 | |
| Coupling base | M327 | 225 | |
| Charge demolition shape | M420 | 273 | |
| Charge demolition shape | M421 | 239 | |
| Cord detonation reinforced (quantity of linear feet used) | M456 | 470,206 | |
| Dynamite military | M591 | 11,895 | |

**Table 4.14:**
**Ammunition Usage at Fort Leonard Wood[1]**

| Type of Ammunition or Explosive | Army Class | Quantity Currently Used at FLW [2] | Remarks |
|---|---|---|---|
| Firing device demolition pressure release | M627 | 68 | |
| Fuze time blasting (quantity of 25-foot long sections used) | M670 | 89,364 | |
| Charge assembly demolition | M757 | 113 | |
| Igniter fuze blast time | M766 | 12,049 | |
| Firing device multipurpose | ML03 | 132 | |

Note:
1 Quantities are expressed in the number of each item (unless noted as lineal feet or gallons).
2 All quantities are approximate, and will vary with the number of students trained. Quantities include usage by active US Army Forces Command and US Army Training and Doctrine Command units.
3 Quantities of HC grenades and smoke pots reflect data based upon usage at the time of initial data collection, FLW stopped using HC based grenades and smoke pots in November 1996 and will replace these items with TPA based systems.

*Source: Harland Bartholomew & Associates, Inc.*

Training range management activities also include the detonation and deactivation of unexploded ordnance on the range where the items were used. This is done for operational safety and EOD training. This activity is not waste management as defined by Department of Defense policy. Range 36 is used for EOD training, but is not used to dispose of outdated, defective, large caliber munitions and explosive ordnance. Small arms ammunition is sent off-site to a Department of Defense facility for disposal. Other unserviceable munitions, including outdated, defective, large caliber munitions and explosive ordnance are shipped to other Department of Defense ordnance facilities for service or reclassification.

## 4.10 PERMITS AND REGULATORY AUTHORIZATIONS

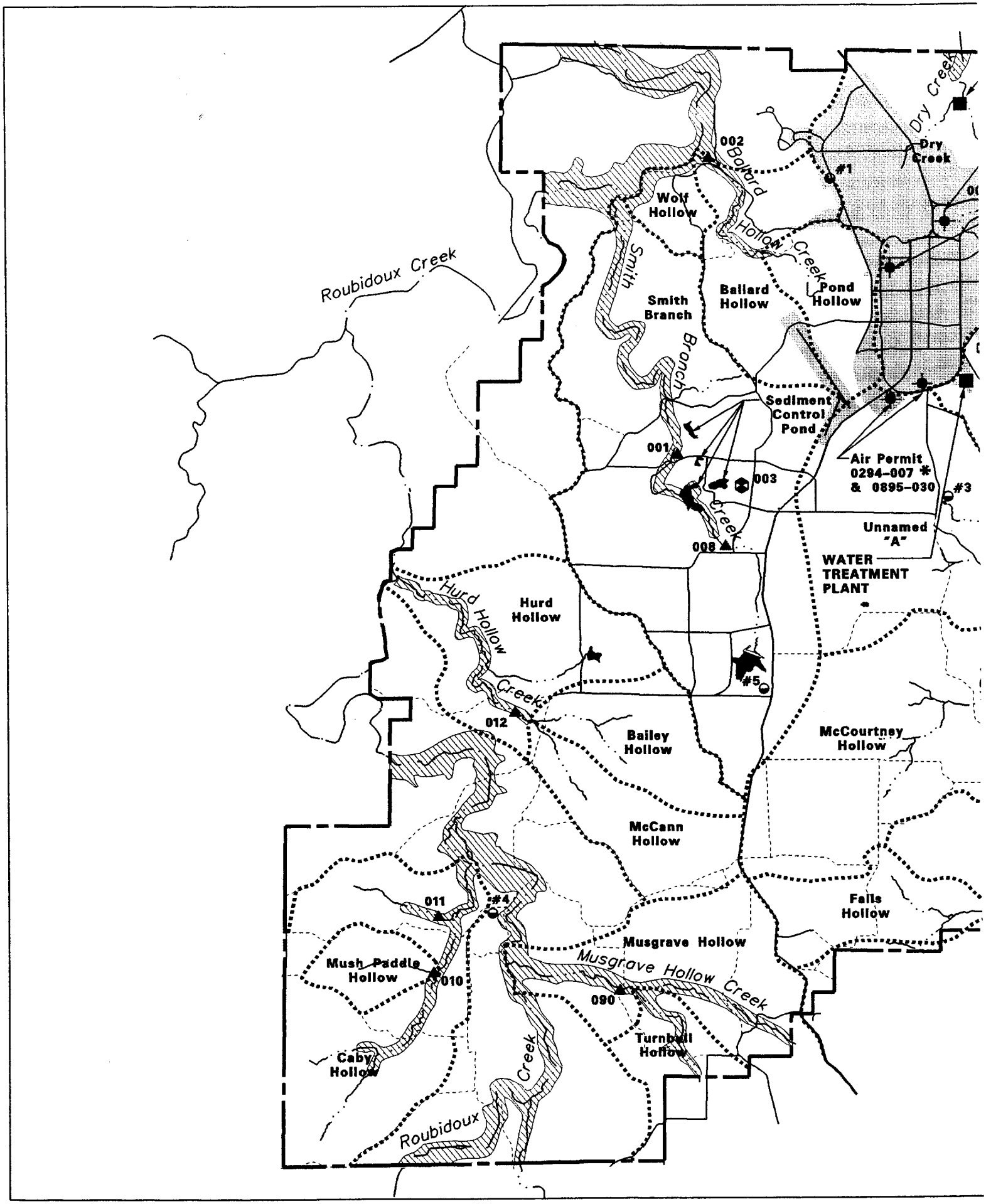
FLW has a proven track record of early agency coordination to establish and scope environmental concerns associated with projects at the installation as identified through the Final Environmental Assessment of the Master Plan and Ongoing Mission of the U.S. Army Engineer Center and Fort Leonard Wood (FLW, 1995c). Each mission is reviewed for regulatory compliance prior to initiation and on a periodic basis. The Army has established the ECAS which is used to review the compliance of ongoing missions and programs with Federal, state and local environmental laws and regulations. MDNR also conducts periodic compliance audits at FLW.

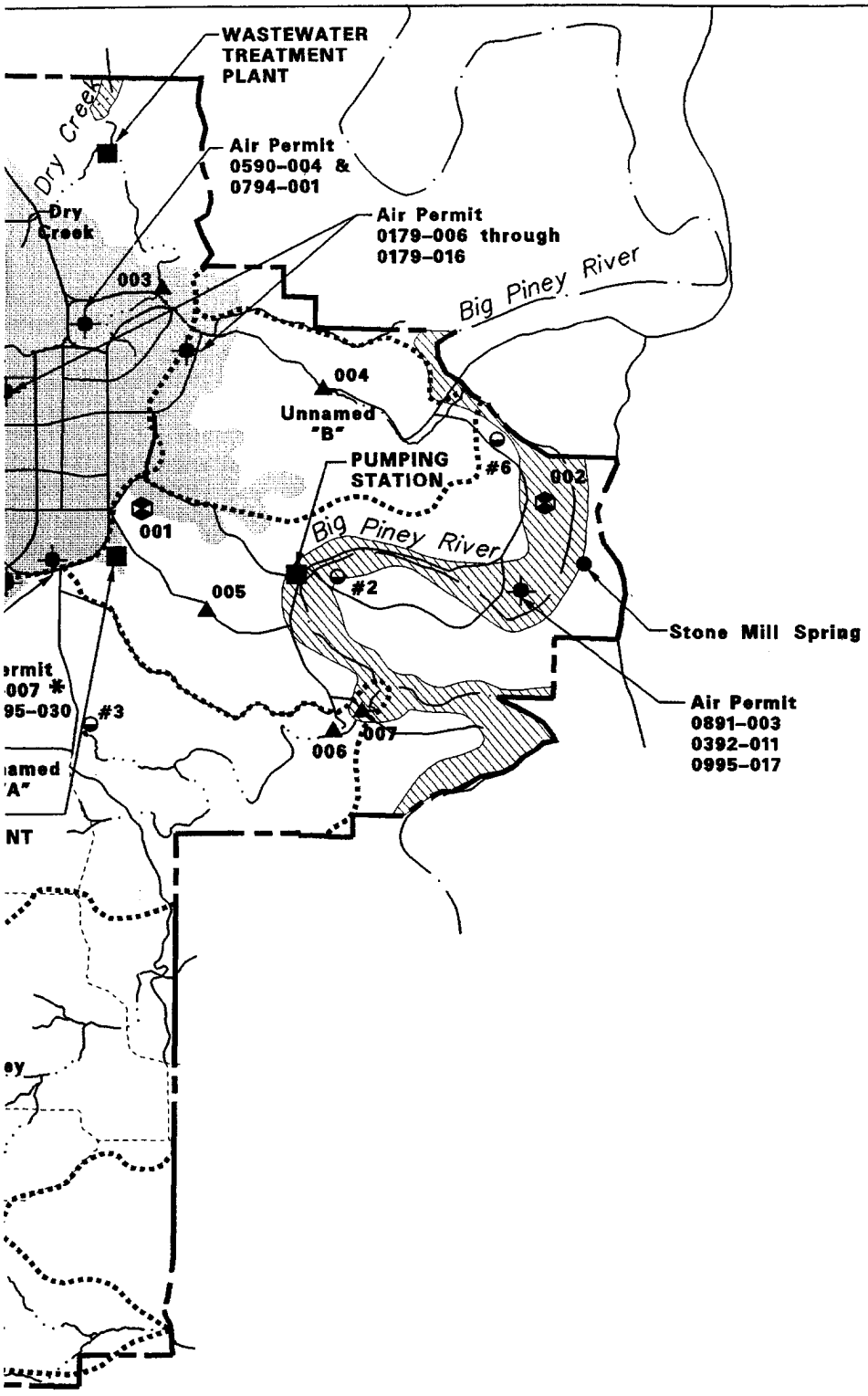
The U.S. Army Engineer Center and Fort Leonard Wood has the mandate to develop a program and training all it's students in the subject of "environmental awareness." This program is directed to all levels of the Army with the intent of:

1) enhancing good environmental stewardship activities in all personnel, and

2) ensuring compliance with all applicable environmental permits, laws and regulations.

The locations of existing air quality and water quality related permitted facilities are illustrated on Figure 4.8. There are a wide range of activities conducted on a regular basis at FLW to support assigned missions. Some of these ongoing mission activities, (such as facilities maintenance and repair, POL storage and dispensing, grounds maintenance, hospital operations, and installation support services) require the post to obtain and maintain permits and licenses. There is a high level of awareness of environmental regulations and responsibilities which influence installation operations. FLW conducts these operations in compliance with applicable regulations and obtains permits when required. The permits may provide further restrictions or monitoring requirements. Environmental monitoring activities currently conducted by FLW are identified in Volume III, Appendix H.


Roubidoux Creek
Dry Creek
Dry Creek
002
Ballard Hollow Creek
#1
Wolf Hollow
Smith Branch
Ballard Hollow
Pond Hollow
Sediment Control Pond
001
003
Air Permit 0294-007 * & 0895-030
#3
Unnamed "A"
008
WATER TREATMENT PLANT
Hurd Hollow
Hurd Hollow Creek
#5
012
Bailey Hollow
McCourtney Hollow
McCann Hollow
011
#4
Falls Hollow
Musgrave Hollow
Musgrave Hollow Creek
Mush Paddle Hollow
010
090
Turnbull Hollow
Caby Hollow
Roubidoux Creek




## LEGEND

- INSTALLATION BOUNDAR
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- CANTONMENT AREA
- REGULATORY FLOODPL (100 year)
- IMPOUNDMENT
- WATERSHED BOUNDARY
- ACTIVE WELL LOCATION
- STORMWATER OUTFALL NPDES PERMIT NO. MO-0117
- WATER TREATMENT PLANT OUTFALL PERMIT NO. MO-0058068
- PERMITTED AIR SOURCE

* PERMIT ALSO COVERS THE AIR SOU LOCATED SOUTH OF THE AIRPORT AT BUILDING 5138.

SOURCE MATERIAL:

FEMA, 1985
FLW, 1996

N

0 1 2

Scale in Miles

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

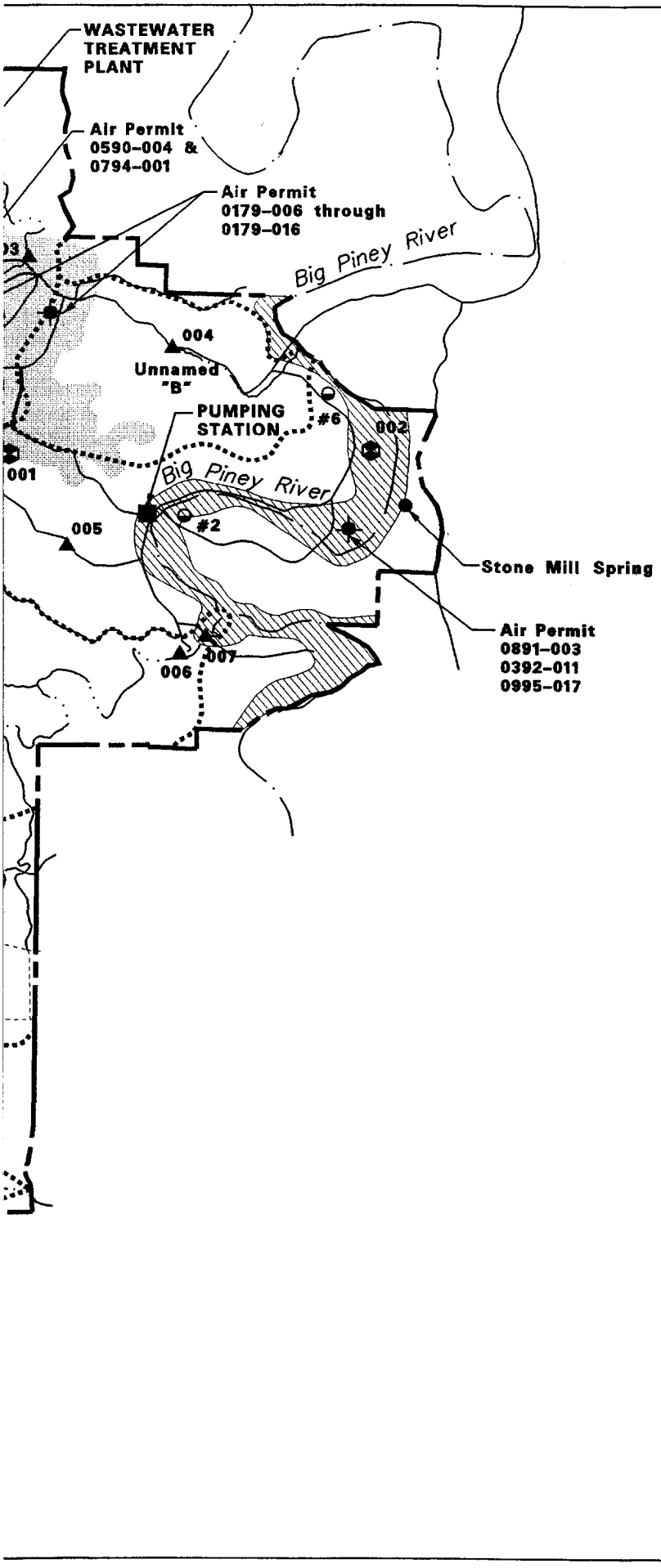
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ENVIRONMENTAL IMPACT STATEMEN

RELOCATION OF U.S. ARMY CHEMICAL SC AND U.S. ARMY MILITARY POLICE SCHOO FORT LEONARD WOOD, MISSOURI

**ENVIRONMENTAL QUALITY MANAGEMENT**

**DATE: MARCH, 1997** | **FIGURE NO. 4**




## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- CANTONMENT AREA
- REGULATORY FLOODPLAIN (100 year)
- IMPOUNDMENT
- WATERSHED BOUNDARY
- ACTIVE WELL LOCATION
- STORMWATER OUTFALL NPDES PERMIT NO. MO-0117251
- WATER TREATMENT PLANT OUTFALL PERMIT NO. MO-0058068
- PERMITTED AIR SOURCE

* PERMIT ALSO COVERS THE AIR SOURCE LOCATED SOUTH OF THE AIRPORT AT BUILDING 5138.

SOURCE MATERIAL:

FEMA, 1985
FLW, 1996

N

0 1 2 3

Scale in Miles

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ENVIRONMENTAL QUALITY MANAGEMENT**

**DATE: MARCH, 1997** | **FIGURE NO. 4.8**

This section will provide a baseline of the permits and licenses associated with the affected environment. This is not an all inclusive listing of permits required or obtained by the installation. This section identifies the existing permits and authorizations which may require review based on the proposed actions. The following descriptions provide information about the existing environmental permits held by the post for its ongoing activities.

### 4.10.1 Air Quality

FLW has obtained required permits for all applicable existing emission sources on the installation. Table 4.15 lists the currently permitted sources, their location, and the permit number.

Since the area is in attainment for all criteria pollutants, any "major stationary source" that undergoes a "major modification" is subject to the Prevention of Significant Deterioration (PSD) construction permit regulations (40 CFR Part 52). The MDNR considers FLW to be a "major stationary source" and therefor required FLW to comply with PSD requirements. Fort Leonard Wood would be considered to undergo a "major modification" for a pollutant if the potential emissions of the modification are greater than the significance level. A PSD construction permit application requires a Best Available Control Technology (BACT) review, air dispersion modeling, an evaluation of Air Quality Related Values (AQRVs) such as visibility, soils analysis, vegetation analysis, and a determination for the need for ambient air monitoring. The MDNR has up to 30 days to determine the completeness of the permit application; and up to 184 days after receiving a complete permit application to issue a PSD construction permit. During the 184 day review period, MDNR may issue a draft permit and allow a 30 day public comment period. At the end of the public comment period, MDNR has the right to hold a public hearing.

**Table 4.15:**
**Fort Leonard Wood Permitted Sources**

| Permitted Source | Location | Permit Number |
|---|---|---|
| Construction Permits For Tanks | POL Bulk Storage | 0179-006 through 0179-016 |
| Incinerator | FLW Army Community Hospital | 0590-004 |
| Quarry Rock Crushing and Screening | 285th Rock Crusher | 0891-003 |
| Quarry Rock Crushing and Screening | Training Area 256 Rock Crusher | 0392-011 |
| Paint Booths (3)<br>Fuel Storage Tanks (6)<br>Parts Washers | Multiple<br>Multiple<br>Multiple | 0294-007 |
| Boilers | B311A Boiler Plant | 0794-011 |
| Fuels Storage (Modification to permit 0294-007) | Multiple | 0895-030 |
| Primary Crusher, Secondary Crusher, Tertiary Crusher, Primary Crusher Engine, Secondary Crusher Engine, Tertiary Crusher Engine, Screens, Conveyors, Surge Bins, Water Pump Engine (replaces permit 0891-003) | Rock Crushing Plant | 0995-017 |

*Source: Fort Leonard Wood, Directorate of Public Works*

The next air quality permit that the installation will need to obtain is the Title V operating permit. Title V of the CAAA established a new Federal operating permit program for all "major" stationary air pollution sources. The operating permit regulations are defined in Missouri 10 CSR 10-6.065. Major sources include facilities with the Potential To Emit (PTE) at or in excess of the major source thresholds for criteria pollutants or HAPs. The threshold amount for each criteria pollutant depends on the attainment status of the area or source category being assessed. Major source threshold limits for HAPs are 10 tons per year of any single HAP and 25 tons per year for any combination of HAPs.

Fort Leonard Wood will apply for a Title V permit, if required. For the purpose of this assessment FLW is assumed to be a "major source" and the PSD requirements were applicable.

The USEPA published interim Federal approval of Missouri's program in the Federal Register in May 1996. FLW is a third year Part 70, therefore the operating permit is due 12 months after Federal approval of the program, or May 13, 1997. The installation has initiated a project to prepare the Title V permit application within the applicable schedule.

Ambient air quality monitoring has not been required by any of the air permits, prior to initiating permit actions for the BRAC related activities..

### 4.10.2 Water Resources

**4.10.2.1 Point Sources - NPDES - Wastewater Treatment.** In compliance with the Missouri Clean Water Law and the Federal Water Pollution Control Act, MDNR has issued FLW an Authorization To Discharge Permit No. MO-0029742 for the wastewater plant which discharges to tributaries to Dry Fork (Big Piney River Basin). The NPDES permit specifies a trickling filter, anaerobic digestors, sand filter, and chlorination as part of the Federally Owned Treatment Works (FOTW). The design flow is 8.4 MGD with sludge production at 1400 dry tons/year. The sludge is land applied on the installation. The NPDES permit identifies seven outfalls. Outfall No. 001 provides for monitoring the discharge from the FOTW and the characteristics of the sludge. Outfalls No. 002 - No. 007 provide for monitoring storm water runoff discharges of selected points on the installation.

**4.10.2.2 Nonpoint Sources - NPDES - Storm Water Discharges.** In compliance with the Missouri Clean Water Law and the Federal Water Pollution Control Act, MDNR has issued FLW Missouri State Operating Permit No. MO-0117251 for storm water discharges to tributaries to Roubidoux Creek and Big Piney River. Twelve outfalls have been identified as compliance monitoring locations. Quarterly or annual monitoring is required for water quality parameters specified within the permit for each outfall.

**4.10.2.3 Drinking Water.** The drinking water systems at FLW are regulated by MDNR under the Safe Drinking Water Act (SDWA) and state regulations. The Army also regulates the drinking water systems under AR 200-1, AR 420-46, and AR40-5. In compliance with MDNR regulations, FLW holds Permit of Approval Number 3079500 for a community water supply to dispense water to the public.

### 4.10.3 Hazardous and Toxic Materials

**4.10.3.1 Hazardous Waste Management.** FLW maintains compliance with the Emergency Planning and Community Right-to-Know Act (EPCRA), Tier II, and Toxic Release Inventory (TRI) reporting. Fort Leonard Wood has attained interim status under RCRA, as a Treatment, Storage, Disposal (TSD) facility as well as being a Large Quantity Generator, and has been provided MO3213720979 as the site generator ID number. An OB/OD unit at Range 36 was proposed for Subpart X - Miscellaneous Treatment Unit permitting. The installation has suspended operations at the OB/OD unit at Range 36.

FLW will maintain an interim status permit until Range 36 and the former temporary storage areas are closed under the RCRA closure plans. In accordance with the regulatory provisions of interim status, the 52 SWMUs as identified in the RCRA Facility Assessment (B&VWST, 1992) are being investigated to determine if further action is required. MDNR and USEPA are providing oversight of these activities.

**4.10.3.2 Petroleum, Oil and Lubricants (POL).** POL bulk storage tanks were required to obtain construction permits prior to installation. FLW obtained air permits (0179-006 through 0179-016) for eleven POL tanks. Air permit Nos. 0294-007 and 0895-030 also address fuel storage units. In accordance with the regulations under the Clean Water Act (CWA) FLW has developed and implemented a SPRP. The installation has provided notification to MDNR for all regulated USTs.

**4.10.3.3 Pest Management.** As described in subsection 4.8.5 of this document, certified pest control operators are used to apply all pesticides. At FLW contractor staff are used for this service except at the golf course, where Department of Defense staff who are certified operators are used.

**4.10.3.4 Radioactive Materials/Waste.** The General Leonard Wood Army Community Hospital maintains Materials License 24-15095-01 from the U.S. NRC for the storage and medical use of radiopharmaceuticals identified in 10 CFR 35.100, 10 CFR 35.200 (excluding Xenon-133), and 10 CFR 35.300. Authority for selected radioactive materials not controlled by the NRC is provided to the General Leonard Wood Army Community Hospital by DA Radioactive Material Authorization (DARA) No. 24-01-96.

Radioactive materials are used for calibration of equipment at the hospital and other non-medical operations on FLW. The calibration sources are generally sealed sources and stored in lead-lined containers ("pigs") to prevent accidental exposure. Equipment used for operations on the post may have sealed sources of radioactive materials within them. Where required the equipment is licensed or authorized by the Army organization responsible for the equipment. Examples of this include the Chemical Agent Alarms which have 250 microcurie of Americium 241 and are used under Army Matériel Command license 12-00722-13. Another example is the soil and asphalt tester which is used under Tank and Automotive Command license 21-01222-05 and contains 10 millicurie of Cesium 137 and 50 milliCuries of Americium 241.

In accordance with the NRC Licenses, the DARA, and equipment authorizations the following list identifies the typical radioactive materials currently in use or permitted for use at FLW.

- Isotopes with atomic Nos. 1-95
- Cobalt-57
- Nickel-63
- Gallium-67
- Strontium/Yttrium-90
- Indium-111
- Iodine-123
- Iodine-131
- Cesium-137
- Thallium-201
- Thorium-232
- Plutonium-239
- Americium-241

## 4.11 BIOLOGICAL RESOURCES AND ECOSYSTEMS

This section includes a description of the plant and animal species, including those listed as Federal and state threatened and endangered, located on the installation. Ongoing wildlife management activities and surveys are discussed in terms of their relationship to aquatic and terrestrial ecosystems. Species lists that have been prepared as a result of surveys and investigations at FLW are included in Volume III, Appendix F.

### 4.11.1 Historical Use of FLW Lands

European settlement of the FLW area began in the 1820s. The original land surveyors reported prairie, savanna and open forests to be common on the uplands and slopes with dense forests in the bottomlands. The settlers logged the forests to obtain lumber for houses, barns and firewood. Cattle and hogs were allowed to graze in the cleared forests and prairies. Many of the cleared bottomlands and level uplands were plowed and used to grow crops. The early settlers continued the Native American practice of using fire every few years to maintain grasslands and control brush. Saltpeter and iron ore were mined and railroads were constructed. The area was largely settled by the 1870s. Repeated logging of forests, grazing and plowing of native grasslands, introduction of European cool season grasses and legumes, and decreased use of fire after the 1870s further altered the native landscape. Past disturbances at FLW are indicated by cemeteries, stone fences, old farm ponds, trails, roads, abandoned quarries and mines, old farmsteads, and historical records (Skinner, 1991; Ryan, 1992; Hays, 1994).

FLW was established in 1940 with the majority of the installation obtained from private owners that used the land to grow crops, raise cattle, and harvest timber products. Soil erosion was a problem and the forests were generally in poor condition. From 1940 to the present, bombing ranges, engineer training areas, small arms ranges, airfields, access roads, a golf course, fishing ponds, sediment ponds, and firebreaks were constructed and maintained outside of the cantonment area. Within the cantonment area

troop housing, administrative buildings, hospital, sewage treatment plant, mess halls, parade grounds, recreational areas, a rail-yard, warehouses, and classrooms were constructed (FLW, 1964; FLW, 1968).

In the 1950s all cattle grazing leases were terminated. Land management, woodland management, and wildlife management plans and programs were initiated by FLW and natural resource staff were hired. By the 1960s natural resource programs had been implemented and expanded. Natural resource management has continued to evolve and improve into the 1990s and recent flora, fauna, timber and wetland surveys have been conducted to support the management decisions. Management plans, cooperative agreements, environmental assessments of ongoing activities, and biological assessments of endangered species have been completed ( FLW, 1994d; FLW, 1994e; and FLW, 1996e).

### 4.11.2 Fish and Wildlife

FLW, which supports a diversity of habitats within its 62,911 acres, provides quality conditions for a wide variety of fish and wildlife. More than 1,300 species of plants, animals, and invertebrates have been noted at FLW (H&H, 1984; USAEHA, 1977; Proffitt, 1993). Common wildlife includes many species of mammals, birds, amphibians, reptiles, fish, mussels, and invertebrates.

Surveys for fish, mussels, small mammals, birds, reptiles and amphibians have been conducted at FLW (Sternburg, 1994a; Sternburg, 1994b; Sternburg, 1995). Common species are listed in subsection 4.11.2, and Federal and state listed species are included in subsection 4.11.5. Resident wildlife species, faunal and floral are also inventoried through the Land Condition Trend Analysis (LCTA) program, which is one of the components of the Integrated Training Area Management Program (ITAM) (TRADOC, 1989c). The LCTA established areas at FLW that are to be used as sites for long term monitoring of flora and fauna. In addition, FLW participates in the Monitoring Avian Productivity and Survival (MAPS) project which is part of the Partners in Flight program that is funded, in part, through the Department of Defense, Legacy Resource Management Program. This program supports the conservation and management of neotropical migratory birds and their habitats on Department of Defense lands. Six MAPS stations were established on the installation during 1993 to monitor production and survival. As part of a long-term monitoring effort, data will be collected periodically at these stations for the next 50 years assuming funding continues to be available.

**4.11.2.1 Mammals.** Forty-seven species of mammals have been identified on FLW. Common mammals include the eastern cottontail, eastern gray squirrel, beaver, coyote, raccoon, striped skunk and white-tailed deer. Two Federally endangered bats are located on the installation (see subsection 4.11.4). Surveys for the endangered bats also noted red bat, eastern pipistrel, Keen's bat, small footed bat, little brown bat, big brown bat, hoary bat, and silver haired bat (FLW, 1996e). Of the 45 caves surveyed at FLW, bats were observed or conditions indicated that bats had used 26 of the caves (Oesch, 1986).

**4.11.2.2 Birds.** Approximately 200 species of birds have been observed at FLW (Proffitt, 1993; DeSante, 1994, DeSante 1995). The large numbers of birds observed at FLW are due to the large size of the installation, geographic location, and the diversity of habitats present.

Neotropical migrants (NTM) are landbirds that breed in temperate America and winter in the New World tropics (NFWF, 1992). A list of neotropical migrants identified as potential breeders at FLW is presented in Volume III, Appendix F. Raptors at FLW include red-tailed hawk, great horned owl, barred owl, and eastern screech owl. Bald eagles have been observed as transients along Roubidoux Creek and Big Piney River during annual winter surveys. Shorebirds identified at FLW that are considered to be transients include spotted sandpiper, least sandpiper, lesser yellowlegs, greater yellowlegs, and Wilson's phalarope. Waterfowl that are considered to be common transients include Canada goose, pintail, mallard, widgeon, shoveler, blue-winged teal, gadwall, and hooded merganser. The wood duck is considered to be a common resident.

**4.11.2.3 Amphibians and Reptiles.** Forty species of amphibians and reptiles have been found at FLW. Amphibians include the bullfrog, leopard frog, cave salamander and dark-sided salamander. Reptiles

include the common snapping turtle, box turtle, northern water snake, skink, black rat snake, garter snake, western cottonmouth and copperheads (Sternburg, 1994).

**4.11.2.4 Fish.** Species commonly found in the streams and ponds include the golden redhorse, smallmouth bass, largemouth bass, green sunfish, longear sunfish, bluegill, rock bass and channel catfish. Data based on a 1994 fish survey by the MDC indicates that 50 species of fish representing 12 families inhabit the Big Piney River and Roubidoux Creek within FLW boundaries (Sternburg, 1995). Seventy species of fish have been found in the overall Big Piney River system (Fleener, 1974).

**4.11.2.5 Mussels.** Surveys were conducted by the MDC in the Big Piney River and in Roubidoux Creek. The MDC considered the mussel fauna to be relatively diverse and has probably changed little since prehistoric times. Two species are considered unique or important by the USFWS. The most common mussel species present was *Actinonaias liqamentina* (mucket). The most diverse mussel fauna were found within an area just upstream of a low dam across the Big Piney River (Sternburg, 1994a, ES 1996b).

**4.11.2.6 Invertebrates.** Studies in 1956, 1976, and 1977 of the bottom fauna of the Big Piney River are documented by the MDNR. According to those investigations, the biological quality of the river was healthy and contained a substantial and varied benthic community. Benthic invertebrate samples taken in February 1996 also indicated a healthy community of invertebrates was present (ES, 1996b). At least 142 different genera or species of bottom dwelling organisms are known to occur in the Big Piney River. The invertebrate fauna is typical of many large Ozark streams, being dominated in numbers by mayflies, caddisflies and stoneflies.

A preliminary report by USAEHA indicated that Roubidoux Creek was in good biological condition, with the benthic organisms being abundant and diverse (USAEHA, 1977). Benthic invertebrate samples taken in February 1996 indicate that there is a healthy population of water quality intolerant species (ES, 1996b).

- Crayfish. MDC concluded that the crayfish fauna at FLW is not very diverse. Two common species were noted, the golden crayfish and spothanded crayfish. Both of these species were numerous (Sternburg, 1995).

- Insects. Ninety-eight families in 13 different orders were found in surveys conducted in 1994. The most common orders of insects (by biomass) captured at FLW were Lepidoptera (moths), Coleoptera (beetles), Diptera (true flies), Trichoptera (caddisflies), Plecoptera (stoneflies), and Homoptera (hoppers). Diptera had the largest number of families and individuals (FLW, 1996g).

### 4.11.3 Vegetation

**4.11.3.1 Community Types and Diversity.** Vegetation on FLW is diverse (USAEHA, 1977; Skinner, 1991; GOM, 1992; ESC, 1993; FLW, 1968; H&H, 1984; FLW, 1964). Within the Natural Divisions of Missouri, FLW is located in Missouri's Ozark Natural Division, Upper Ozark Section. The MDNR and MDC developed classifications for the terrestrial natural communities of Missouri (Nelson, 1987) that is based on substrate, moisture, and/or dominant plants. FLW has approximately 40 different natural communities based on this classification. Dominant plant community types include upland forest, bottomland forest, savanna, prairie, marsh, and swamp.

**4.11.3.2 Surveys.** Surveys of the flora, fauna, and natural features present at FLW have been and are continuing to be conducted through the Legacy Resource Management Program (LRMP). The LRMP is funded by the DOD and involves the Natural History Division of the MDC and The Nature Conservancy. A floral inventory of FLW was conducted in 1989 by the Oklahoma Biological Survey. In addition to creating an index to the botanical species at FLW the survey has established a herbarium collection with specimens being located at FLW and the U. S. Army Construction Engineering Research Laboratory (USACERL). The current list identifies approximately 680 species of plants known to occur on the installation. Further surveys could increase this total to 900 species of native plants (Skinner, 1991).

**4.11.3.3 Forest.** Forest cover is the principal vegetative type, covering approximately 80 percent of the installation. Although the oak-hickory association is dominant, the sycamore-elm-soft maple association is frequently found along creeks and river bottom lands. The vegetative cover on north facing slopes consists of black, red and white oaks with an understory of dogwood, shadbush and redbud. As the landform orientation becomes southerly, the plant composition changes to post oak, blackjack oak, and black hickory. Other common species present include black cherry, sugar maple, hawthorn, slippery elm, hackberry, buckeye, and hornbeam. Herbaceous understory is mostly absent on the dry uplands with closed canopies but may include bush clover, panic grass, Virginia creeper, poverty oat grass, and wood sorrel when the canopy is more open. Moist bottomland forests have a more dense understory that contain pale violet, greenbriar, bellflower, jewelweed, mayapple, and golden ragwort. There are several shortleaf pine stands located throughout the installation.

**4.11.3.4 Grasslands.** Old fields and grasslands occur over approximately 10 percent of the installation. A prescribed burn program maintains these habitats. Common growths of old fields include eastern red cedar, native warm season grasses, blackberries, sumac, coralberry, persimmon, goldenrod, and sassafras. Native, deep rooted, perennial plants are becoming reestablished and spreading in non-forested areas that are less often disturbed by training activities. Native grassland species that have been noted include Indian grass, little bluestem, big bluestem, switchgrass, sideoats grama, leadplant, Virginia lespedeza, roundhead lespedeza, white prairie clover, butterfly milkweed, purple coneflower, compass plant and prairie dock.

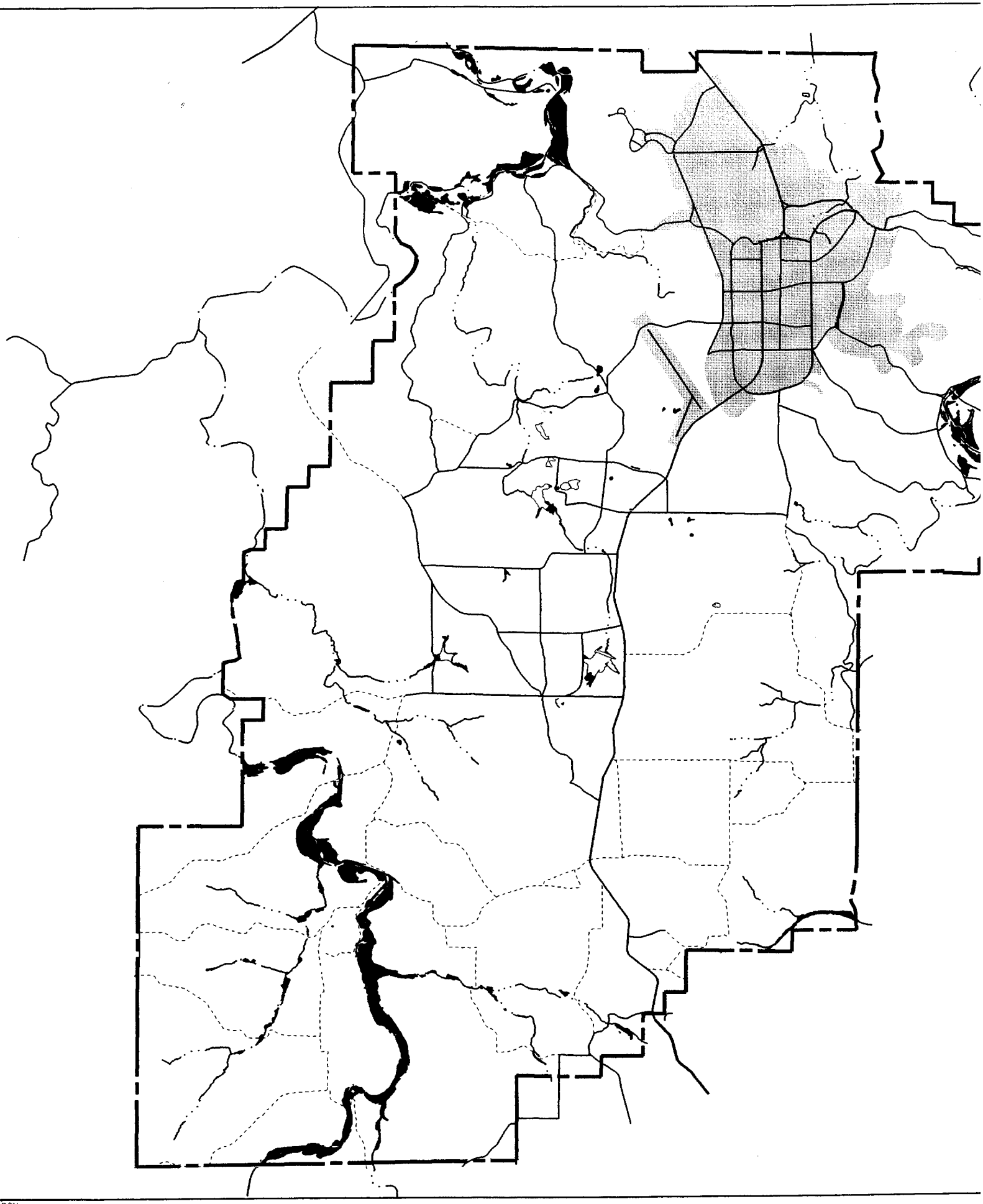
**4.11.3.5 Landscaped, Developed, and Disturbed Areas.** Most of the native vegetation has been removed from much of the cantonment area, heavy equipment training sites and some of the firing ranges. Some landscaped areas still contain native tree species such as post oak, blackjack oak, black hickory and eastern red cedar. Common species found in or around the cantonment area, golf course, old homesteads, cemeteries, heavy equipment training areas, target emplacements, and other disturbed areas include tall fescue, Kentucky bluegrass, pin oak, elms, poison ivy, multiflora rose, horse nettle, orchard grass, crabgrass, Johnson grass, Japanese honeysuckle, red clover, white clover, crown vetch, redtop, Scotch pine, white pine, tulip popular, bald cypress, dandelion, Queen's Ann Lace, Austrian pine, and privet.

**4.11.3.6 Wetlands.** In 1987/1988, an initial wetlands survey was conducted by the Kansas City District, Corps of Engineers. Field visits were made to known or suspected wetland areas and potential wetland areas were delineated on aerial photographs. Notes were taken at each site to describe the dominant vegetation. This initial survey resulted in the identification of 34 potential wetland areas with a combined area of 142 acres, plus an additional 84 acres in two "special" areas.

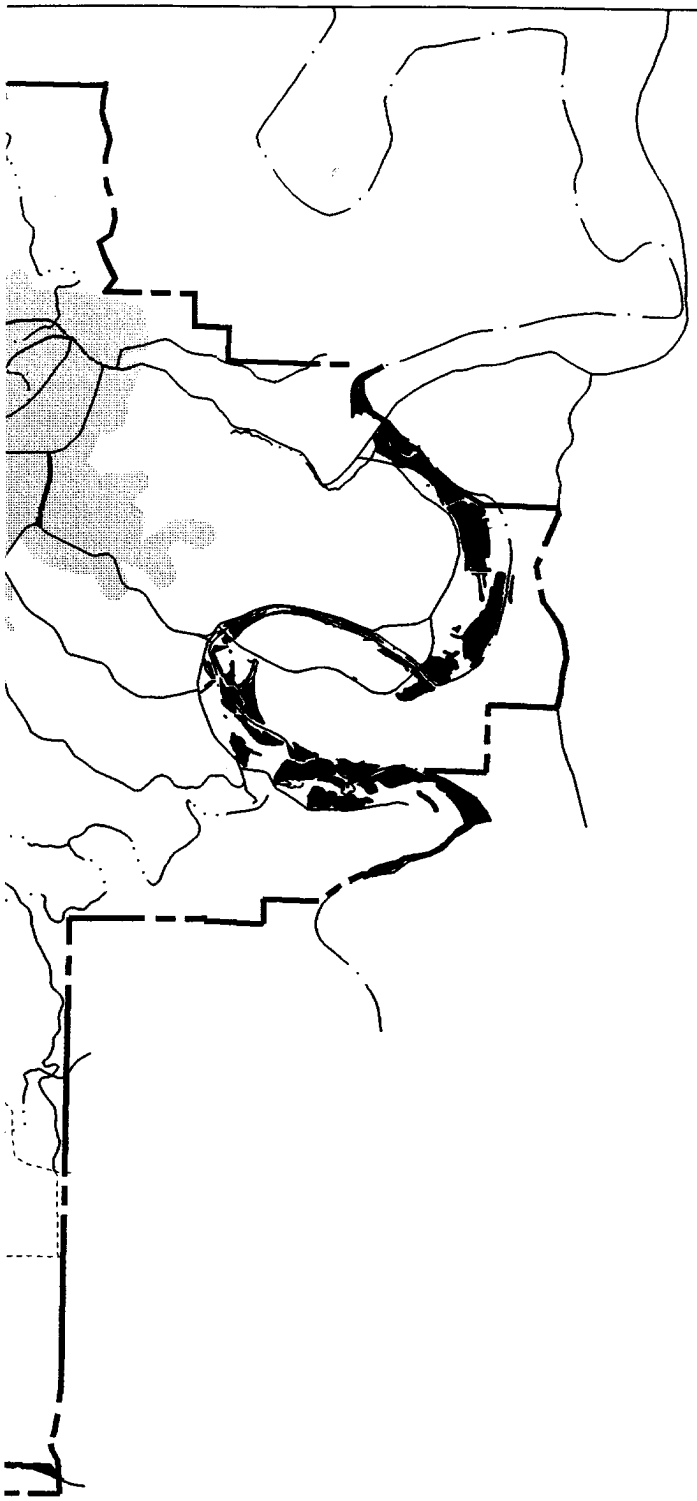
During 1993 and 1994, potential jurisdictional wetland determinations were made based on field surveys (FLW, 1995e; FLW, 1995f). These wetland surveys were conducted to determine potential jurisdictional wetland areas, the official regulatory status of a wetland site will be determined on a case by case basis when siting new construction or other activities. Over 1,552 acres of potential wetlands have been identified at FLW, and these areas are illustrated on Figure 4.9.

A total of 17,580 acres of the 62,911-acre installation were surveyed during the field activities and included all major areas that support significant wetlands and that are likely to be affected by future land use decisions on the installation. Additional inventory efforts would probably locate additional wetland sites, especially those associated with springs, seeps and shallow freshwater marshes. Many of these sites would be located in headwater, low-order tributaries and at small isolated sinkholes scattered throughout the installation's upland areas.

The greatest wetland acreage occurs in the Roubidoux Creek (848 acres), Big Piney River (530 acres), and Falls Hollow floodplains (30 acres). Collectively, these three drainages include about 90 percent of the total wetland acreage identified for the installation. The total wetland acreage represents about 2.5 percent of the installation's land base. Of the 226 sites that were evaluated, 184 sites were considered potential jurisdictional wetlands, 21 sites were considered nonjurisdictional wetlands, and 21 sites required additional field investigations to determine their status. Jurisdictional status is determined



17WET.DGN



## LEGEND

- INSTALLATION BOUNDARY
- ALL WEATHER ROAD
- SEASONAL ROAD
- CREEK / RIVER
- INTERMITTENT STREAM
- CANTONMENT AREA
- WETLAND AREAS [1]

[1] Potential jurisdictional wetlands

SOURCE MATERIAL:

HBA, Wetlands Survey 1995c; 1995d.

N

0 1 2 3

Scale in Miles

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**WETLANDS**

**DATE: MARCH, 1997** | **FIGURE NO. 4.9**

for compliance with Section 404 of the Clean Water Act and Executive Order 11990 (Protection Of Wetlands) at the time of project development. Jurisdictional wetlands are defined by criteria in the 1987 Army Corps of Engineers Wetland Delineation Manual. The Manual defines wetlands as "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Eight wetland types and/or special aquatic sites have been identified on the installation. Listed in order of decreasing abundance (i.e. total acreage), the types included: bottomland hardwood (90 percent); shallow marsh (7.3 percent); shrub swamp (0.9 percent); shrub flat (0.7 percent); wet meadow (0.5 percent); gravel bar (0.3 percent); deep marsh (0.2 percent); and spring-associated wetlands (0.1 percent).

### 4.11.4 Management Programs

**4.11.4.1 Recreational Hunting and Fishing.** Fish and wildlife management at FLW is in accordance with the Integrated Natural Resources Management Plan 1993-1997. This plan was prepared in accordance with the Sikes Act (Public Law 99-561), AR 200-3 (DA, 1995a) and the Cooperative Plan Agreement between the Installation Commander, the U.S. Department of the Interior and the MDC. Because military missions and resource management programs at FLW impact fish, wildlife, and their habitats, management activities focus upon programs designed to create and enhance habitat that are consistent with the military missions of the installation. The need for and success of these programs is illustrated by the approximately 42,000 recreation use days spent hunting and fishing on the installation in a recent typical year.

Wildlife habitat management includes a rotational timber harvest program to create various successional stages of forested habitat; prescribed burning, firebreaks and wildfire control for habitat improvement; establishing and maintaining water facilities which function as fish habitat; and establishing and maintaining wildlife water units and sedimentation basins.

Other programs which contribute to wildlife habitat management at FLW include: an agricultural lease program; rehabilitation and management of bivouac areas; provision of artificial nest structures; the establishment and maintenance of food plots; and promoting the growth of native species and grasses throughout the installation.

**4.11.4.1.1 Hunting.** The population of game species at FLW is managed through a regulated harvest during established seasons. Hunting and fishing occurs on FLW under the guidance of FLW Regulation 210-21, Hunting and Fishing Regulations (FLW, 1994b). This regulation directs the management and operation of approximately 51,000 acres available for hunting. The most popular animals hunted at FLW are deer and wild turkey. A census of each of these species is conducted annually, and harvest limits are adjusted if needed. No significant changes in these programs are anticipated for the near future.

The number of permits sold for the firearms deer season harvest between 1970 and 1992 ranged from 686 to 2,437. FLW also hosts a special managed deer hunt in cooperation with MDC. Since 1976 the percentage of the total deer harvest taken during the special managed hunt has varied from 23 percent to 43 percent of the total harvest.

Turkey hunting is allowed in the spring and fall seasons at FLW. The spring is the primary season and is limited to a total of 300 hunters. An additional 50 permits are also authorized for active duty personnel. There is no quota on fall firearms turkey permits and the number of hunters ranged from 89 to 265 between 1978 and 1992.

Hunting for rabbit, gray and fox squirrels, northern bobwhite, and woodcock are also popular activities at FLW. Small game species are not formally surveyed, but general trends of these populations are informally monitored. Although populations fluctuate annually, overall trends are on the increase and small game hunting is expected to increase (ESC, 1993). Increases in furbearer hunting and trapping is not anticipated unless pelt prices increase.

Waterfowl harvest is minimal and is not expected to increase significantly in the future. A waterfowl census is taken in conjunction with the annual bald eagle survey.

**4.11.4.1.2 Fishing.** Several lakes and ponds are actively managed at FLW to produce a quality fishery and to furnish optimum recreational fishing opportunities for the public. Bloodland Lake (50 acres), Bloodland Pond (2.5 acres), and Penn's Pond (9 acres) are the primary recreational fishing reservoirs at FLW, but many small ponds throughout the installation also provide quality fish habitat and fishing recreation. The MDC participates in the FLW fish management program by assisting with impoundment stocking, biannually sampling selected impoundments, recommending management strategies and harvest regulations, and providing technical assistance.

Bloodland Lake and Penn's Pond are the most significant fishing impoundments at FLW and the fish populations in these impoundments are sampled biannually by the MDC. Other impoundments are sampled if determined necessary by the FLW natural resource personnel. The primary fish management practices employed for FLW impoundments are: 1) the placement and/or maintenance of fish habitat structure using brush piles; 2) chemical, biological and/or mechanical control of aquatic macrophytes and algae; 3) fish population monitoring; 4) population control through harvest restriction and reduced limits; and 5) pond construction and fishing access management.

Roubidoux Creek and Big Piney River are the primary streams that transect the FLW installation, and they provide a quality stream fishery. Management efforts at the Big Piney River have been directed at developing a trophy smallmouth bass fishery. Approximately 3,900 catchable-size (approximately 12 inches) rainbow trout are stocked in the Stone Mill Spring Trout Management Area by the MDC through a Cooperative Agreement. Additional trout are purchased with fees generated from issuance of FLW hunting and fishing permits.

Management practices designed to enhance the fishery at FLW include supplying fish habitat structures in conjunction with pond construction, providing adequate access to fishing areas, improving water quality by maintaining vegetative cover, and minimizing soil losses from training areas.

**4.11.4.1.3 Non-game Species.** Non-game species benefit from habitat management practices undertaken for game species. Wildlife management at FLW also includes the re-introduction of species. Typically these species were extirpated from the region as a result of the loss of habitat or through unregulated harvest. Ruffed grouse were introduced on the USFS land adjacent to FLW to the northeast, and river otters were released on the Big Piney River. Management efforts for these species will be directed toward habitat improvements in an attempt to encourage population growth. FLW also cooperates with the MDC in surveying for black bears to document the extent of the bears range expansion into Missouri. The black bear has not been confirmed at FLW, but is expanding its range in southern Missouri.

**4.11.4.2 Timber Management.** Timber management at FLW is conducted in accordance with the INRMP (ESC, 1993) and AR 200-3. As identified in the INRMP, recent trends in timber management emphasize ecosystem management and biodiversity rather than commodity production. For FLW this translates into a move towards using more uneven age management in the forest management program. FLW has historically used even age management in their forestry program and, as such, changes in the forest management program are anticipated.

Currently, timber management practices include timber sales and timber stand improvements. There are 33,600 acres of managed forest on FLW. This acreage is divided into 95 management compartments which comprise 3,100 timber stands. The estimated volume for six of the most important commercial timber species at FLW is 44.8 Million Board Feet (MBF). Two timber sales, each approximately 250 acres in size and in different forest management blocks, occur each year, with an informal sales target of approximately 1 MBF per year. Most commercial timber on the installation is in the oak-hickory forest type. NEPA compliance, including coordination regarding endangered species and cultural resources, is accomplished prior to each harvest.

**4.11.4.3 Management Guidelines and Regulations.** There are many other laws, regulations, programs, management plans, and technical guidelines that are currently in effect that help to insure the proper management of natural resources at FLW. Federal laws include: the Clean Water Act; Endangered Species Act; Fish and Wildlife Coordination Act; Migratory Bird Treaty Act; Wetlands Conservation Act; National Wetlands Preservation Act; Bald Eagle Protection Act; and Farmland Protection Policy Act. Army regulations include: AR 200-3 Land, Forest, and Wildlife Management; AR 200-1 Environmental Protection and Enhancement (DA, 1990b); and AR 200-2 Environmental Effects of Army Actions (DA, 1988). Technical guidance is included in: the Erosion Control Management Plan for Army Training (USACERL, 1990b); Management Options for Mitigating Natural Resource Training Impacts on Army Installations (USACERL, 1990a); TM 5-630 Land Management; TM-5-631 Forest Management; TM 5-633 Fish and Wildlife Management; TM 5-635 Outdoor Recreation and Cultural Values; TM 5-803 Environmental Protection; TN 420-74-5 Wetlands Enhancement Protection and Management (DA, 1991a); Missouri Vegetation Management Manual (MDC, 1993); Prescribed Burning Manual (MDC, no date); and Wetland Restoration Enhancement or Creation (USDA-SCS, 1992).

### 4.11.5 Threatened and Endangered Species

FLW provides habitat for two Federally listed endangered bat species and the Federally listed threatened Bald Eagle. Table 4.16 provides a listing of these species. Species that have a designated state status and that are known to occur on FLW are listed on Table 4.17. Management practices are described in the INRMP (ESC, 1993).

**Table 4.16:**
**Federal Listed Species That Occur at Fort Leonard Wood**

| Common name | Scientific name | Taxonomic group | Federal Status |
|---|---|---|---|
| Bald eagle | *Haliaeetus leucocephalus* | bird | T |
| Gray bat | *Myotis grisescens* | mammal | E |
| Indiana bat | *Myotis sodalis* | mammal | E |
| Federal<br>E - endangered<br>T - threatened | | | |
| *Source: Harland Bartholomew & Associates, Inc.* | | | |

**Table 4.17:**
**State Listed Species That Occur at Fort Leonard Wood**

| Common name | Scientific name | Taxonomic group | State Status |
|---|---|---|---|
| Eastern wood rat | *Neotoma floridana* | mammal | SU |
| Golden mouse* | *Ochrotomys nuttalli* | mammal | SU |
| Long-tailed weasel* | *Mustela frenata* | mammal | R |
| River otter | *Lutra canadensis* | mammal | WL |
| Bell's vireo | *Vireo bellii* | bird | WL |
| Bewick's wren | *Thryomanes bewickii* | bird | WL |
| Brown creeper | *Certhia americana* | bird | SU |
| Cerulean warbler | *Dendroica cerulea* | bird | WL |
| Cooper's hawk | *Accipiter cooperii* | bird | R |
| Red-shouldered hawk | *Buteo lineatus* | bird | WL |
| Sharp-shinned hawk | *Accipiter striatus* | bird | R |
| Blacknose shiner | *Notropis heterolepis* | fish | R |
| Bluestripe darter | *Percina cymatotaenia* | fish | R |

**Table 4.17:**
**State Listed Species That Occur at Fort Leonard Wood**

| Common name | Scientific name | Taxonomic group | State Status |
|---|---|---|---|
| Plains topminnow | *Fundulus sciadicus* | fish | SU |
| Eastern hellbender | *Cryptobranchus alleganiensis* | amphibian | WL |
| Grotto salamander | *Typhlotriton spelaeus* | amphibian | WL |
| Ringed salamander | *Ambystoma annulatum* | amphibian | WL |
| Bald grass | *Sporobolus ozarkanus* | flowering plant | SU |
| Buffalo clover | *Trifolium reflexum var reflexum* | flowering plant | SU |
| Butternut | *Juglans cinerea* | flowering plant | WL |
| Celestial lily | *Nemastylis nuttallii* | flowering plant | SU |
| Narrowleaf rushfoil | *Crotonopsis linearis* | flowering plant | SU |
| Royal catchfly | *Silene regia* | flowering plant | WL |
| Elktoe | *Alasmidonta marginata* | mussel | SU |
| Spectaclecase | *Cumberlandia monodonta* | mussel | WL |
| Central Missouri cave amphipod | *Allocrangonyx hubrichti* | crustacean | R |

Notes: E - endangered
R - rare
SU - status undetermined
WL - watch list
EXT - extirpated, former breeding species
*LCTA record not confirmed by MDC.

*Source: Harland Bartholomew & Associates, Inc.*

**4.11.5.1 Indiana Bat.** Detailed information describing Indiana bats on FLW is provided in the Biological Assessment of the Master Plan and Ongoing Mission (FLW, 1996E), and the Biological Assessment evaluating the BRAC action at FLW (FLW, 1996h). A summary of information describing Indiana bat summer habitat is available in the *Literature Summary and Habitat Suitability Index Model; Components of Summer Habitat for the Indiana Bat, Myotis sodalis* (Rommé, 1995).

The Indiana bat was listed as endangered in 1967. No designated critical habitat for this species occurs on FLW. The range-wide population of the species is declining. Population decreases have been most dramatic in Missouri, and appear to be continuing. The 1991 Missouri population was approximately 54 percent of the recorded high for the state. The largest populations of this species hibernates in caves during the winter in Missouri, Indiana, and Kentucky. Four caves (Brooks, Davis No. 2, Wolf Den, and Joy) on FLW support declining numbers of hibernating Indiana bats during winter months (September-April). The Indiana Bat Recovery Plan (USFWS, 1983) designates Brooks Cave Priority 2 (a hibernaculum with recorded populations of 1,000 to 3,000 bats) and Davis No. 2, Wolf Den, and Joy caves are Priority 3 (a hibernaculum with recorded populations less than 1,000). Great Spirit Cave, a Priority 2 cave located 3.5 km west of FLW, also supports a hibernating population. Signs prohibiting entry during this period are posted at entrances to these caves as recommended by MDNR and USFWS. Most Indiana bats hibernating on FLW are thought to migrate to northern Missouri or Iowa during summer months to establish dispersed maternity colonies.

Indiana bats also occur during summer months on FLW. Extensive trapping efforts in 1994 captured two reproductive females and an adult male. In the summer, Indiana bats forage at night in upland and riparian forest, and consume night flying insects. Female Indiana bats bare young in maternity roosts beneath the loose bark of dead trees. Summer habitat of marginal or better quality is common on FLW. Any of the 42,580 forested acres on FLW may provide potentially suitable summer foraging and roosting habitat for Indiana bats.

**4.11.5.2 Gray Bat.** Detailed information describing gray bats on FLW is provided in the Biological Assessment of the Master Plan and Ongoing Mission (FLW, 1996e) and the Biological Assessment evaluating the BRAC action at FLW (FLW, 1996h).

The gray bat was listed as endangered in 1976. No designated critical habitat for this species occurs on FLW. Gray bats occur throughout most of southern Missouri. The population of gray bats in this area is "stable or increasing" (MDC, 1992). The gray bats that summer on FLW are thought to hibernate during the winter in Coffin Cave in Laclede County, outside FLW. Two caves (Saltpeter No. 3 and Freeman) support gray bats during the maternity season (April-October). The Gray Bat Recovery Plan (USFWS, 1982) designates Saltpeter No. 3 biological significance 4, because it is known to support a maternity population between 1,000 and 10,000 gray bats. In the past, Freeman Cave has been given a biological significance rating of 7 because it was known only to be used for brief periods by small numbers of gray bats. Although the biological significance rating has not been changed, studies done for the BRAC Biological Assessment (FLW, 1996h) indicate that gray bats use Freeman Cave during all seasons except winter. Freeman Cave may provide high quality gray bat maternity habitat. Great Spirit Cave, 3.5 km west of FLW, also supports a maternity colony. Great Spirit Cave is a Priority 1 cave and designated biological significance 2, because it is one of the most important maternity colonies, and it is known to support more than 10,000 gray bats. Surveys in 1994 estimate the presence of approximately 7,500 gray bats in maternity caves on FLW. A sign at the entrance to Saltpeter No. 3 Cave prohibits entry during the maternity season, however there is no sign currently installed at Freeman Cave.

Gray bats use habitat along Roubidoux Creek and its tributaries, as well as other areas on FLW. Radiotelemetry surveys (FLW, 1996e) document use of approximately 3,000 acres on FLW. Gray bats feed predominantly on night flying, aquatic-based insects. Female gray bats give birth in maternity caves, where adults and young are sensitive to disturbance.

**4.11.5.3 Bald Eagle.** Detailed information describing bald eagles on FLW is provided in the Biological Assessment of the Master Plan and Ongoing Mission (FLW, 1996e), and the Biological Assessment evaluating the BRAC action at FLW (FLW, 1996f).

The bald eagle was listed as endangered in 1978. Population increases prompted downlisting in 1995 to threatened. No designated critical habitat for this species occurs on FLW.

Bald eagles are known to occur on FLW only during winter (November-March). Eagles have been sighted perching along Roubidoux Creek and Big Piney River. No night roosts have been located. Annual aerial surveys have detected between four and ten eagles on or adjacent to FLW. The winter population on FLW appears to be static. Between three and thirty-nine eagles are sighted in annual surveys in Pulaski County outside the installation. The population outside the installation appears to be increasing. Three bald eagle nests occur along the Gasconade River in Pulaski County, each is at least 6 miles from FLW.

**4.11.5.4 Biological Assessment of the Master Plan and On-Going Mission.** To assure compliance with Section 7 of the Endangered Species Act, and in coordination with the Columbia Field Office of the USFWS, a Biological Assessment (BA) was completed in 1996 to assess effects of the ongoing mission at FLW (FLW, 1996e). Fort Leonard Wood expended substantial effort to assess the current status of Indiana bats, gray bats and bald eagles on the installation. Field studies for the BA included extensive mist net surveys, radiotelemetry, noise and seismic evaluations, insect sampling, analysis of Indiana bat and gray bat diet, and evaluations of the behavior of bald eagles on FLW. The BA concluded that continuation of existing actions at FLW may affect Indiana bats, gray bats, and bald eagles.

The USFWS issued a Biological Opinion (BO) of the Master Plan and On-Going Mission on 31 December 1996 (USFWS, 1996). The BO concluded that direct, indirect and cumulative effects of the Master Plan and On-Going Mission would not jeopardize the continued existence of the Indiana bat, grey bat or bald eagle. No critical habitat has been designated for these species in the action area, therefore none will be affected.

The BO included obligatory Reasonable and Prudent Measures (RPMs) and Terms and Conditions of the BO, and FLW will design a biomonitoring plan. The plan will include monitoring biotic media (tissue of non-endangered bats, bat guano, fish, and aquatic sediments) for presence of HC, malathion, dursban, and/or TPA. Installation biologists will coordinate with the Missouri Department of Conservation (MDC) to monitor populations of gray bats in certain caves and bald eagles on the installation. Fort Leonard Wood

will provide to the MDC annual reports outlining results of biomonitoring. In addition to biomonitoring, FLW will verify the use of colored smoke grenades does not pose significant risks to T & E species. To protect T & E species, FLW will comply with RPMs that restrict time and location of malathion and TPA use during between March 15 and October 31.

Fort Leonard Wood will continue to implement conservation measures already in place to protect Indiana bats and gray bats. In cooperation with MDC, FLW has established management guidelines for Indiana bats and gray bats on the installation. Protection zones, use restrictions related to training and other installation activities, and timber management practices have been designated for important Indiana bat and gray bat habitat. Fort Leonard Wood is investigating levels of human disturbance and necessity of installing gates at hibernacula. Conservation measures are discretionary actions implemented voluntarily by FLW.

### 4.11.6 State Natural Area and Unique Habitats

**4.11.6.1 State Natural Areas.** Natural features are ranked by the MDNR as "significant", "exceptional", and "notable" in decreasing order of importance, size, and quality. A significant rating indicates statewide importance, relatively large size, high quality, and some type of protection is recommended. An exceptional rating indicates regional importance, smaller relative size, high quality, and should be given consideration when management plans are being developed or implemented. Management activities of these types of areas are identified in the INRMP (ESC, 1993). A notable rating indicates local importance only, small size or moderate quality, and do not merit management actions unless associated with exceptional or significant sites (Ryan, 1992). The following natural areas have been identified on FLW.

- **Falls Hollow Sandstone Glades.** Four sandstone glades are located in the southeastern corner of the installation along the Falls Hollow drainage. These four glades are identified as the Falls Hollow glades and contain royal catchfly, bald grass, and buffalo clover. The uniqueness of this site is enhanced by a waterfall, sandstone arch, and a sandstone canyon, which are considered exceptional natural features. A small shrub swamp, and some seeps also contribute to this site. The glades, which total approximately four acres, are considered a significant natural feature by the MDC and are some of the largest glades to occur on the Roubidoux sandstone. Species diversity includes 215 species of vascular plants, five species of bryophytes, and six species of lichens (Hays, 1994).

- **Boundary Pit Cave.** Located in the extreme northwest corner of FLW. Boundary Pit Cave is a 125 feet deep cave formed by the recent collapse of a sinkhole, and is ranked as a significant natural feature by the MDC.

- **Pond Marsh.** Pond Marsh is a sinkhole pond approximately four acres in size that is located west of Forney Army Airfield near Training Area 246. It has a notable ranking as a natural community.

- **Caves.** There are approximately 50 caves on FLW. Notable-to-significant rankings were designated by the MDC for the following caves: Brooks, Henshaw, Joy, Davis #2, Freeman, Saltpeter #3, Martin, Maxey, Wolf Den, and Killman. Thirty-five of 45 caves inventoried contained invertebrates and 10 of 45 caves contained amphibians.

- **Great Blue Heron Heronry.** A great blue heron heronry is located near endangered bat caves, jurisdictional wetlands, and in a controlled access range area. The heronry has a notable ranking as a state listed species site.

- **Big Piney River.** Big Piney River has a MDC exceptional ranking for small river/aquatic community. The Big Piney was also nominated for, but did not obtain Wild and Scenic River status. The Wild and Scenic nomination was for the river's outstanding scenic, recreation, geological, fish and wildlife values (USDA FS, 1984).

- **Roubidoux Creek.** Roubidoux Creek has a MDC significant ranking as a geological feature. It is a losing stream that recharges Roubidoux Spring. Roubidoux Creek is considered a "special area" by the USFS (USDA FS, 1984). Special areas have unusual environmental, recreation, cultural, and historical values.

**4.11.6.2 Threatened and Unique Natural Communities.** State identified threatened habitats that occur or have the potential to be restored at FLW include: mesic bottomland forest, wet bottomland forest, freshwater marsh, dolomite/limestone savanna, chert savanna, sandstone savanna, mesic prairie, and wet prairie (Nelson, 1987; MDC, 1989). In addition a unique habitat type, dolomite glade, occurs at several locations along Roubidoux Creek and the Big Piney River on steep slopes and southern exposures (Skinner, 1991; Ryan, 1992; Hays, 1994).

## 4.12 CULTURAL RESOURCES

### 4.12.1 Cultural - Historical Summary

The regional cultural chronology currently being developed for FLW is based on chronologies developed for Missouri and the Midwest. This sequence is divided into the following periods: Paleoindian (12,000 - 8500 B.C.), Dalton (8500 - 6800 B.C.), Early Archaic (6800 - 5000 B.C.), Middle Archaic (5000 - 3000 B.C.), Late Archaic (3000 - 1000 B.C.), Early Woodland (1000 - 500 B.C.), Middle Woodland (500 B.C. - A.D. 400), Late Woodland (A.D. 400 - 900 ), and Mississippian (A.D. 900 - 1700).

These periods represent culturally distinct segments of more than 14,000 years of human adaptation and readaptation to a changing environment. This sequence has developed out of decades of archaeological research in Missouri and the Midwest, and it forms a framework that is useful for organizing and interpreting new archaeological data.

Paleoindian occupations have not been identified at Fort Leonard Wood. The Dalton Period and all Archaic Periods are represented. With the exception of the Early Woodland period, Woodland occupations are well defined with Late Woodland occupations found on a variety of landscapes well into the A.D. 1400 timeframe. No Mississippian sites are present, but there is limited evidence of Late Woodland Mississippian interaction.

In general, the prehistoric cultural sequence reflects a trend toward increasing sociocultural and technological elaboration over time. The earliest stages are characterized by egalitarian hunting and gathering band-level societies, but by the end of the prehistoric period, more socially complex groups with an agricultural economic base had developed. However, some prehistoric cultural developments in the Ozark region appear to differ somewhat from those characteristic of the Midwest as a whole. Eventually, it will be necessary to develop a distinct regional chronology for the Ozarks.

Prehistoric site types recognized at Fort Leonard Wood include open camp/habitation sites, caves, rock shelters, and cairns. The later occur singly or in clusters and represent mortuary sites exclusive to the Late Woodland and Mississippian Periods.

A recent history of the Ozarks, Pulaski County, and FLW (Smith, 1993) provides an overview and context for the settlement and growth of Fort Leonard Wood and the surrounding area. The Osage tribe occupied much of the Ozarks and southwestern Missouri during the 17th and 18th centuries. By the late 18th century and early 19th century displaced eastern tribes moved into the area including short stays by the Kickapoo, Delaware, Shawnee, and Cherokee. French explorers, traders, and lead miners arrived in the early part of the 18th century. The first pioneers arrived about 1800 establishing trading posts, living in isolated cabins, and subsisting by hunting and trapping. As populations increased isolated farmsteads, rural hamlets, and small villages began to appear. By the mid-19th century, the mining and timber industries greatly expanded with an associated growth in population, villages, roads, and railroads. In Pulaski County farming, hunting, and lumbering was the economic base until WW I. By the 1930s the Federal government had become an important economic and social factor especially with the establishment of the Mark Twain National Forest and programs of the Civilian Conservation Corps. When

WW II erupted, the Army moved rapidly to establish FLW on 65,000 acres in southern Pulaski County.

Historic archaeological site types on the installation include farmsteads, homesteads, industrial sites (lumbering and mining), dumps, rural hamlets, and military sites.

### 4.12.2 Compliance Activities

For the past sixteen years historic properties investigations including Phase I archaeological surveys, Phase II archaeological testing, and historic structures evaluations have been authorized and carried out at FLW in compliance with the:

- National Historic Preservation Act of 1966 as amended (P.L. 89-665),
- Executive Order 11593 (U.S. Code 1971),
- Archaeological Resources Protection Act of 1979 (P.L. 96-95), and
- the Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601) (NAGPRA).

To date there have been ten Phase I archaeological surveys conducted within the post boundaries and with the completion of FY 96 surveys approximately 40,684 acres (approximately 64.6 percent of the installation) will have been surveyed for cultural resources. Approximately 379 archaeological sites including 228 prehistoric and 151 historic sites have been recorded. Phase II National Register of Historic Places (NRHP) evaluation has been conducted at 73, with an additional 5 sites funded for Phase II investigations during FY 96.

All of this work has been carried out by professional archaeological organizations under contract with the Kansas City District Corps of Engineers, U.S. Army Construction Engineering Research Laboratory (USACERL), U.S. Army Waterways Experiment Station, or FLW. A few small surveys have been carried out by the post archaeologist. As of January 1995, 51 sites have been identified as eligible for listing on NRHP, and 89 additional sites have been identified as potentially eligible for the NRHP.

As a result of prior architectural and historical surveys of all FLW property two buildings have been determined to meet the eligibility requirements for listing on the NRHP.

- One of these structures is the WW II era Black Officer's Club, which is located in the cantonment area. A mural located inside this building was painted by black soldiers. Stonework surrounding the building was constructed by German Prisoners of War. The mural and stonework were recently restored using Legacy funds.

- The other is the Rolling Heath School, which is one of only two buildings remaining from the demolition of the existing settlements prior to construction of the installation.

The previous investigations have been carried out and reviewed pursuant to section 106 of the National Historic Preservation Act of 1966 as amended. To facilitate the section 106 process, a Memorandum of Agreement was executed in 1986 between FLW, the Missouri State Historic Preservation Office, and the Advisory Council on Historic Preservation.

Artifact and human skeletal remains collected during the numerous investigations mentioned above are curated in compliance with the Curation of Federally-owned and Administered Archaeological Collections (36 CFR 79), and the NAGPRA. This legislation requires FLW to inventory their collections and provide for their proper curation and access for study. Archaeological materials collected from completed surveys and testing projects are currently housed at the University of Missouri, Columbia's American Archaeology Division (AAD) Museum of Anthropology, a Federal repository. Future collections will also be housed at the AAD facility. In addition, all human remains and artifacts that are covered under NAGPRA are being curated at the AAD facility. In compliance with Sections 5 and 6 of NAGPRA, these collections have been inventoried and pertinent tribal groups such as the Osage and Sac/Fox have been notified. Consultation with these groups regarding repatriation and inadvertent discovery has begun.

Further guidance for the management of the historic resources at FLW is provided by:

- the evaluation of historical resources within the cantonment area (FLW, 1987);
- the 1992 Installation Building Survey (IBS) (FLW, 1992b) to determine building and structures that may be eligible for the NRHP; and
- the completion of an Historic Preservation Plan (HPP) (FLW, 1992c).

A HPP is a management tool which provides a prehistoric and historic overview of a facility, an initial inventory of known historic properties, and inventory strategy for identifying unknown or inadequately known historic properties, NRHP evaluation strategies and standards, and treatment or protection standards that will insure the preservation or reduce adverse effects to significant historical properties. This management process is continuous, requiring that the plan be updated as new sites are recorded as building and maintenance plans change. The Missouri State Historic Preservation Office approved the HPP in May of 1993 (Appendix G, Letter from MDNR to FLW).

For specific information regarding these many compliance activities the reviewer may refer to the body of data and bibliography in the HPP (FLW, 1992c) and the latest archaeological report (Kreisa et. al. 1996) which contains references and a review of archaeological investigations that have been completed since the HPP was completed.

### 4.12.3 Legacy Resource Management Program

The Legacy Resource Management Program was established by the Congress of the United States in 1991 to provide the DOD with an opportunity to enhance the management of stewardship resources on over 25 million acres of land under DOD jurisdiction.

Legacy allows FLW, and all other DOD locations, to determine how to better integrate the conservation of irreplaceable biological, cultural, and geophysical resources with the dynamic requirements of military mission activities. The program is designed to encourage the formation of partnerships with Federal, state, local agencies and private groups.

Several Legacy programs have been completed at FLW. These studies have included both natural and cultural resource inventories and management initiatives as listed below:

- Geomorphology Project (FY92-93)
- ARPA Training (FY93)
- Natural/Cultural Interpretive Center at Rolling Heath School Project (FY93-94)
- Miller Cave Complex Project (FY93)
- Miller Cave Stabilization Project (FY 95)
- Black Officers Club Restoration and Archival Project (FY93-94)
- Geoarchaeological Model (FY94)
- Bio Diversity Project (FY94)
- Sedimentation Ponds Project (FY92)

## 4.13 SOCIOLOGICAL ENVIRONMENT

To consider the sociological issues associated with the proposed action, this section discusses the demographics of FLW and its environs, visual and aesthetic value, Native American and other ethnic concerns, homeless programs, public safety, fire protection, and environmental justice.

### 4.13.1 Demographics

**4.13.1.1 Fort Leonard Wood Population.** As indicated in Table 4.18, FLW's average daytime population for FY95 was 18,673, or a reduction of 10,832 from FY90. The on-post population is comprised of an average of 8,977 military personnel; 5,425 military family members; and 4,271 civilians. FLW's daytime population exceeds that of any of the surrounding communities in Pulaski and adjacent

counties. Total on-post resident population for FY95 was 13,358, or 9,403 less than in FY90. Reductions in Initial Entry Training (IET)/student load training accounted for the majority of this decrease in on-post resident population.

Approximately 1,043 active military personnel and 2,124 military family members live off-post. In addition, over 3,000 military retirees live within a 50-mile radius of the FLW installation.

Although FLW'S training missions have annually processed over 30,000 personnel during peacetime conditions, this level of training declined to under 30,000 during FY95. Initial Entry Training (Basic Training, OSUT, AIT) accounts for almost 90 percent of the training load, with professional development (Non-Commissioned Officers and Officers) comprising the remainder.

**Table 4.18:**
**Fort Leonard Wood Population**

| Classification | FY90 | FY95 |
|---|---|---|
| **Average Daytime On-Post Population** | | |
| *Military* | | |
| Permanent Party Military (includes both on- and off-post residency) | 7,263 | 4,174 |
| Trainees/Students [1] | 10,513 | 4,803 |
| *Civilian* | | |
| DOD Civilian Employees | 2,199 | 1,903 |
| Other Civilian Employees [2] | 2,729 | 2,368 |
| Military Family Members | 6,801 | 5,425 |
| **Total Resident Population [3]** | **22,761** | **13,358** |
| **Average Daytime Population** | **29,505** | **18,673** |
| **Off-Post Population** | | |
| Military Personnel, Permanent Party (off-post residency) | 1,815 | 1,043 |
| Military Family Members | 2,738 | 2,124 |
| **Total Off-Post Population** | **4,553** | **3,167** |
| **Total Population** | **32,243** | **20,797** |

Notes:
1 Represents "average" daytime training load.
2 Includes non-appropriated funds (NAF), contractor, Red Cross, etc.
3 Includes trainees/students/other; military family members; and that portion of the total permanent party military which lives on base.

*Source: Fort Leonard Wood, Directorate of Resource Management (FLW, 1990d).*
*Fort Leonard Wood, Directorate of Resource Management (FLW, 1995a)*

**4.13.1.2 Regional/Local Population.** The area considered as FLW's region of socioeconomic influence (ROI), as defined by the Economic Impact Forecast System (EIFS) (EIFS, 1990), consists of nine counties with Pulaski County being the center of the region and realizing the greatest economic and social impacts from FLW. The ROI incorporates every county within a 50-mile, or one-hour, commuting radius of the installation. This area is considered a primary impact area since it receives both direct and indirect economic benefits from FLW operations. Such benefits include off-post purchase/rental of housing; purchase of goods and services; and employment generation as directly and indirectly related to DA civilian and military employment associated with FLW. Almost 100 percent of the off-post military and civilian personnel associated with FLW reside within this nine-county area. This area is also the primary trade area for installation associated personnel as over 75 percent of the retail market purchases are made within the ROI (Gross, 1995).

As indicated in Table 4.19, the population of this nine-county region increased from 197,849 in 1980 to 211,820 in 1990—a seven percent increase as compared to a four percent increase statewide. The counties to the north and west of FLW experienced the greatest population increases ranging from

37 percent in Camden County to 12 percent in Laclede and Miller counties. Pulaski County and Dent County were the only counties in the region to decrease in population during the 1980-90 period. Lebanon (Laclede County) and Rolla (Phelps County) are the largest communities within the region with populations of 9,983 and 14,090 respectively in 1990. The 1995 population estimate (DEMOG, 1995) of 221,892 for this nine-county region represents almost a five percent increase since 1990.

Eighty percent of the above increase in the regional population was due to a natural change in population (births minus deaths) with the remainder attributable to net in-migration. During the above period the region experienced a net in-migration of 3,057. However, four of the nine counties experienced a net out-migration with Pulaski County registering a net out-migration of 6,039 from 1980-1990 (UE, 1992). The majority of this population loss was directly related to changing operations at FLW. Conversely, Camden, Laclede and Miller counties had substantial net in-migration stimulated by industrial development, and the recreation and retirement industry of the Lake of the Ozarks. Because of the lifestyle attractions and other amenities, the population of the region is projected to increase to approximately 221,000 in the year 2000 (DEMOG, 1995), and 247,236 by the year 2010 (UE, 1992) with Camden County and Pulaski County projected for the greatest absolute increases. These projections do not include any realignment actions at FLW which could positively or negatively affect future populations.

**Table 4.19:**
**Fort Leonard Wood Regional and Local Population Trends, 1980-2000**

| County | 1980 Population | 1990 Population | Percent Change | 1995 Estimated Population | 2000 Projected Population |
|---|---|---|---|---|---|
| Camden | 20,117 | 27,495 | +37 | 30,562 | 33,317 |
| Dent | 14,517 | 13,702 | -6 | 13,576 | 13,480 |
| Laclede | 24,323 | 27,158 | +12 | 28,543 | 29,868 |
| Maries | 7,551 | 7,968 | +06 | 7,952 | 7,929 |
| Miller | 18,539 | 20,700 | +12 | 21,305 | 21,944 |
| Phelps | 33,633 | 35,248 | +05 | 36,732 | 37,869 |
| Pulaski | 42,011 | 41,307 | -2 | 44,051 | 46,803 |
| Texas | 21,070 | 21,476 | +02 | 22,029 | 22,639 |
| Wright | 16,188 | 16,758 | +04 | 17,142 | 17,555 |
| **Total** | **197,849** | **211,820** | **+07** | **221,892** | **231,404** |
| St. Robert | 1,733 | 1,730 | 0 | na | na |
| Waynesville | 2,879 | 3,207 | +11 | na | na |
| **Total** | **4,612** | **4,937** | **+07** | **na** | **na** |
| **Missouri** | **4,916,766** | **5,117,073** | **+04** | **5,232,217** | **5,329,656** |

*Source: U.S. Census of Population (Census, 1990) and Missouri State Demographer, Population Projections (DEMOG, 1995)*

Pulaski County is considered as the local area of influence since the majority of FLW is located within this county, and therefore has the greatest socioeconomic influence upon it. The U.S. Census population count for Pulaski County includes resident military personnel on the installation, and, thus, reflects to a great extent drawdowns and buildups in military strength. Pulaski County's peak population of 54,000 occurred in 1970, reflecting the Vietnam-era training load at FLW, and decreased thereafter to 41,307 in 1990. Over one-half of Pulaski County's population lived on the FLW installation in 1990. In addition, another 12,000 personnel (military and dependents, army retirees, DA civilians and other employees) directly associated with the installation lived off-post, primarily in Pulaski County. According to FLW zip code residency records, approximately 90 percent of all civilian employees live in the four-county area of Pulaski, Phelps, Texas and Laclede counties, with 60 percent of the total residing in Pulaski County. Off-post military residency reflects the same geographic pattern, only with a higher concentration (82 percent) in Pulaski County.

The local communities of St. Robert and Waynesville experience the greatest direct impacts from FLW. The socioeconomics of both of these communities is closely linked to activity levels on the installation since these two communities supply a large proportion of the off-post demand for commercial services and housing. St. Robert provides the majority of the commercial services oriented towards the installation, while Waynesville has captured a larger share of the residential growth resulting from operations at FLW. As indicated in Table 4.19, Waynesville, the largest of these two incorporated communities, increased in population by 11 percent from 1980-90, while St. Robert remained essentially stable.

### 4.13.2 Visual/Aesthetic Resources

FLW is richly endowed with natural resources that greatly enhance the aesthetic value of the area. Located in the northern foothills of the Ozark Mountains, the area conveys an image of rugged forested hills and ridges, with picturesque intervening valleys; clear, spring-fed streams; limestone bluffs dotted with caves; and an abundance of fish and wildlife which support fishing and hunting activities. The Big Piney River and Roubidoux Creek corridors, which are located only a short distance from the cantonment, retain much of their original wilderness character. The scenic bluffs and ridges overlooking the valley areas provide spectacular panoramic views.

The physical layout of FLW reflects the natural constraints imposed by ridge tops, hillsides and valleys. Narrow tree-covered valleys remain between clusters of development, and function to divide the installation into small sectors that have a comfortable "human" scale. Tree masses together with the open expanse of parade grounds and athletic fields, located in the center of the cantonment, provide a visual contrast to the surrounding highly developed areas. This central open space also acts as an orientation and focal point for the installation, and thus represents a valuable aesthetic resource.

Many of the more recently constructed buildings on the installation are aesthetically pleasing, and complement the surrounding natural and man-made environment. In addition, landscaped areas are well-maintained and create attractive settings. Two recent policy decisions have significantly improved the visual image of FLW. These include the demolition of the majority of the World War II temporary wooden buildings, and the development of the new campus-like U.S. Army Engineer School which is a major focal point on the installation.

### 4.13.3 Native American and Other Ethnic Concerns

Less than one percent of the population in the nine-county ROI of FLW is identified as being Native American according to the 1990 U.S. Census. Approximately 1.5 percent is identified as being of Hispanic origin, with approximately one percent being of Asian/Pacific Islander origin.

### 4.13.4 Public Safety

#### 4.13.4.1 Law Enforcement

- **On-Post**. General law enforcement responsibility on FLW is divided between the Provost Marshal's office, U.S. Army Criminal Investigation Command, and the FBI. The military authorities have off-post jurisdiction over offenses committed by military personnel under the Uniform Code of Military Justice. The military law enforcement authorities coordinate their off-post activities with local law enforcement authorities on a case-by-case basis. As with most TRADOC installations, FLW is an open post with no fenced boundaries nor perimeter road.

- **Off-Post.** The Pulaski County Sheriff provides law enforcement for all of the county except FLW and the municipalities of Waynesville, St. Robert, Dixon, Richland and Crocker, which have their own police forces. There are 11 full time and five auxiliary officers on the Waynesville force, and seven full time officers and four dispatchers on the St. Robert force. Off-post police have no jurisdiction on the post and the military police have no jurisdiction off-post, with the exception of

offenses committed by military personnel. There are no support agreements between the installation Military Police and the local police forces.

#### 4.13.4.2 Fire Protection

- **On-Post.** FLW's DPW Fire Department provides all fire protection services on-post with three fire stations currently in use. Building 386, located at the intersection of Missouri Avenue and First Street, serves the northern cantonment and family housing areas; Building 1178, located near the intersection of Iowa Avenue and Caisson Drive, serves the southern cantonment and Family Housing; while Building 5001 at Forney AAF is both a structural and crash-and-rescue station. Additions are planned for buildings 386 and 5001, as neither facility can currently house the required vehicles.

  A verbal mutual aid agreement is in place and a written agreement is pending with the MDC, Forestry Division. An interservice support agreement, which includes firefighting, is in place with the United States Department of Agriculture, Forest Service, for Mark Twain National Forest near Rolla, Missouri.

- **Off-Post.** Off-post fire protection services in the immediate vicinity of FLW include the Waynesville Municipal, Waynesville Rural and St. Robert Municipal fire departments. These three departments have a formal mutual aid agreement and utilize the same fire fighters, approximately 40 volunteers. The Waynesville Rural Fire Department has the most equipment and is responsible for a larger geographical area. In addition, the installation has mutual aid agreements (whereby FLW provides support to surrounding communities) with the majority of the rural volunteer and municipal fire departments in Pulaski County, Phelps County, the northern half of Texas County, and the city of Lebanon in Laclede County.

### 4.13.5 Environmental Justice

On February 11, 1994, President Clinton issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* (FR, 1994) (See Volume III, Appendix D for copy of Executive Order). The purpose of this executive order is to avoid the disproportionate placement of adverse environmental, economic, social or health impacts from Federal actions and policies on minority and low-income populations or communities. An element emanating from this order was the creation of an Interagency Federal Working Group (IFWG) on Environmental Justice comprised of the heads of seventeen Federal departments and agencies, including the Department of Army. Each department or agency is to develop a strategy and implementation plan for addressing environmental justice. It is to be the Army's policy to fully comply with Executive Order 12898 by incorporating environmental justice concerns in decision-making processes supporting Army policies, programs, projects and activities. In this regard, the Army ensures that it will identify, disclose and respond to potential adverse social and environmental impacts on minority and/or low income populations within the area affected by a proposed Army action.

The initial step in this process is the identification of minority and low-income populations that might be affected by implementation of the proposed action or alternatives. For environmental justice considerations, these populations *are* defined as individuals or groups of individuals which are subject to an actual or potential health, economic or environmental threat arising from existing or proposed Federal actions and policies. *Low income* is defined as the aggregate annual mean income for a family of four in 1989 correlating to $12,674.

Low income and minority population data was compared for Pulaski County, the nine-county ROI, and the State of Missouri. This comparative analysis is summarized in Table 4.20. The percent of low income persons is higher for the FLW ROI (18.0 percent) than for the State of Missouri (13.3 percent), while the percent minority population is considerably lower for the ROI (5.2 percent) than for Missouri (12.3 percent). Pulaski County has the highest percentage of minority population (19.8 percent), while Dent and Wright counties have the highest percentage of low income persons (25 percent). The minority

population in Pulaski County consists primarily (75 percent) of military trainee/students associated with FLW.

**Table 4.20:**
**Minority and Low-Income Populations, Fort Leonard Wood Environs, 1990**

| County | Total Population | Percent Non-White Population | Median Household Income | Percent Persons Below Poverty Level [1] (Includes Poor/Very Poor)[1] | Percent Persons Below 50% of Poverty Level (Very Poor Only) |
|---|---|---|---|---|---|
| **FLW Region of Influence (ROI)** | | | | | |
| Camden | 27,495 | 0.8 | $22,564 | 12.6 | 4.9 |
| Dent | 13,702 | 1.0 | 16,594 | 25.2 | 9.1 |
| Laclede | 27,158 | 1.3 | 20,122 | 16.7 | 4.8 |
| Maries | 7,976 | 1.5 | 19,041 | 16.5 | 5.7 |
| Miller | 20,700 | 0.6 | 18,985 | 17.5 | 5.5 |
| Phelps | 35,248 | 4.2 | 20,885 | 18.5 | 7.7 |
| ***Pulaski*** [2] | **41,307** | **19.8** | **21,559** | ***14.9*** | **5.1** |
| Texas | 21,476 | 1.1 | 16,757 | 22.9 | 6.7 |
| Wright | 16,758 | 1.9 | 15,770 | 25.3 | 10.0 |
| ***Total/Avg. (ROI)*** | ***211,820*** | ***5.2*** | ***Est. $20,000*** | ***18.0*** | ***6.3*** |
| ***State of Mo.*** | **5,117,073** | **12.3** | **$26,362** | **13.3** | **5.7** |

Notes: 1 The poverty threshold for a family of four persons was $12,674 in 1989 as used in the 1990 U.S. Census.
2 Includes FLW.

*Source: 1990 U.S. Census of Population.*

## 4.14 ECONOMIC DEVELOPMENT

### 4.14.1 Regional Economic Activity

Total employment in the nine-county ROI in 1993 was 111,032, an increase of 24 percent since 1980 - exceeding the 19 percent statewide increase in employment during this period (EIFS, 1990 (BEA Employment Time Series)). Camden County (85 percent), Laclede County (33 percent), and Phelps County (25 percent) had the greatest relative and absolute increases. Pulaski County employment, which mirrors the changing level of military activity at FLW, increased only 8 percent from 1980 through 1990, but still accounted for 20 percent of the total employment within the nine-county region in 1993. Per capita annual incomes in 1990 ranged from $7,692 in Wright County to $12,403 in Camden County, with median household incomes ranging from $15,770 in Wright County to $22,564 in Camden County. Pulaski County had the second highest median household income ($21,559) within the ROI.

The regional non-agricultural civilian labor force (excluding military personnel) totaled 97,646 in 1991 (EIFS, 1990 (BLS Labor Force Time Series)), an approximate 6 percent increase from 1988. Camden, Laclede and Phelps counties again had the greatest absolute increase in the civilian labor force during this ten-year period. The overall average annual unemployment rate was 7.7 percent in 1990, and is currently estimated at 6.5 percent for 1995 (MDLIR, 1995a).

Table 4.21, which portrays the distribution of the employed labor force by major industry sectors for Pulaski County, the ROI, and the state of Missouri, reflects the dominating influence of FLW on local and regional employment. Almost 60 percent of the total employment in Pulaski County is government related, the majority of which is associated with FLW. Overall, government employment comprises over

25 percent of the total employment within the nine-county region, as compared to the statewide average of approximately 14 percent.

**Table 4.21:**
**Employment Distribution by Standard Identification Code, 1993[1] (Percent Employment by Place of Work)**

| SIC Code | Industry | Pulaski County | Region of Influence [2] | State of Missouri |
|---|---|---|---|---|
| 07 | Agricultural. Services, Forestry, Fishing | neg. | 0.7 | 1.0 |
| 10 | Mining | neg. | neg. | .2 |
| 15 | Contract Construction | 3.1 | 6.1 | 5.3 |
| 19 | Manufacturing | 3.2 | 13.3 | 14.5 |
| 40 | Transportation/Other Public Utilities | 2.3 | 4.0 | 6.1 |
| 50 | Wholesale Trade | 0.7 | 2.7 | 5.1 |
| 52 | Retail Trade | 13.1 | 20.0 | 17.6 |
| 60 | Finance, Insurance, Real Estate | 2.7 | 4.7 | 7.1 |
| 70 | Services | 15.1 | 21.9 | 28.9 |
| 91 | Government | 59.1 | 25.6 | 14.1 |
| TOTAL | | 100.0 | 100.0 | 100.0 |

Notes: 1 Employment does not include farm workers.
2 Includes Camden, Dent, Laclede, Maries, Miller, Phelps, Pulaski, Texas and Wright counties.

*Source: U.S. Department of Commerce, Bureau of Economic Analysis, 1995.*

Retail trade, services and manufacturing, and agriculture are the other primary sectors of regional employment. The proportion of regional employment in retail trade exceeds the statewide average, while the proportion of employment in services and manufacturing is less than the statewide average. Retail trade and services comprise a larger regional share of employment in Camden County and Miller County, due primarily to the tourism industry associated with the Lake of the Ozarks recreational area. The proportion of the employed labor force in retail trade in Pulaski County is much lower than for the ROI. Manufacturing is dispersed throughout the region, with the greatest concentration of industrial activity in Laclede County. Lead mining, once an important employment generating industry in the region, has declined dramatically during the past decade and is not expected to recover to its former significance.

Industry sector employment projections for the region have been developed by the Missouri Department of Labor and Industrial Relations (MDLIR, 1995b) by extrapolating past trends into the future. These projections, however, do not reflect changing conditions or events which could influence future employment, such as realignments and mission changes associated with FLW. Growth in regional employment in the major industry sectors during the 1990-2000 period is expected to exceed the statewide increase, especially in respect to manufacturing, trade, services and government. The extensive recreational area in the Lake of the Ozarks region will continue to be a strong stimulant to growth in the trade and service industries.

### 4.14.2 Installation Contribution, Local Expenditures

FLW is a major generator of economic activity within the surrounding nine-county ROI. Military personnel account for almost 10 percent of the non-farm jobs in the nine-county area, and almost 40 percent of the employment in Pulaski County (USDC, 1995). Table 4.22 provides a summary of the local and regional economic impact of FLW.

| Table 4.22: Fort Leonard Wood Economic Impact, FY 1995 | |
|---|---|
| **Category** | **Dollars** |
| **Payroll** | |
| Military Payroll | $230,800,000 |
| Civilian Payroll [1] | 72,700,000 |
| **Payroll Subtotal** | ***$303,500,000*** |
| **Operating Costs** | |
| Military Clothing & Subsistence | $28,900,000 |
| Contracts & Services [2] | 62,900,000 |
| Operating Supplies/Equipment | 25,400,000 |
| Major Equipment Items | 44,100,000 |
| Other [3] | 9,200,000 |
| **Operating Costs Subtotal** | ***$170,500,000*** |
| **TOTAL** | **$474,000,000** |
| Notes: 1 Includes Department of Army (DA) civilian and Non-Appropriated Fund (NAF) salaries.<br>2 Includes contract employee salaries.<br>3 Includes CHAMPUS, Federal Impact Aid, Army Emergency Relief, Red Cross, tuition assistance, miscellaneous. | |
| *Source: Fort Leonard Wood Directorate of Resource Management ( FLW, 1995a).* | |

Combined military and civilian employment at the FLW installation comprises approximately 13 percent of the total non-farm regional employment. The most direct economic impacts of the installation are in the form of payroll, and expenditures for contracts, goods and services. Overall, the installation is responsible for the direct generation of $474 million annually in payroll and expenditures for base operations.

Expenditures for contracts and services by FLW totaled $62.9 million in FY95, with the majority of these expenses incurred regionally. In addition, construction projects on the installation further impact the regional economy in the form of construction wages paid and purchase of services and supplies.

All of the above direct economic impacts have a ripple effect on the regional economy as wages earned are subsequently used for the purchase of goods and services on a local and regional level. This activity results in a multiplier effect on secondary employment generation, additional wages earned, and sales of goods and services. Overall, the installation's payroll and operational expenditures are responsible for the direct and indirect generation of over $400 million annually in sales (business) volume revenue, and over $350 million in income (Volume III, Appendix E, EIFS Model - Existing Operations) within the ROI.

### 4.14.3 Military Force Structure, Salaries and Expenditures, Property Values

Tables 4.23 and 4.24 depicts the military force structure at FLW for FY95 and projected for FY96. Trainees account for the majority of the military force with an average daily training load (billet load) of 4,803 in FY95, which is projected to increase to 6,182 for FY96 increasing the total number of trainees which will be trained at FLW to approximately 36,996 per year. This projected increase is anticipated upon completion of currently planned and approved ITRO reorganizations. As illustrated in Table 4.24 permanent party strength, consisting of officers, warrant officers and enlisted, exceeds 4,000 personnel.

**Table 4.23:**
**Military Force Structure, Students**

| Classification | FY95 | FY96 (Projected) |
|---|---|---|
| **Initial Entry Training** | | |
| Basic Training (BT) | 16,001 | 20,442 |
| One Station Unit Training (OSUT) | 3,080 | 3,906 |
| Advanced Individual Training (AIT) | 6,285 | 9,595 |
| **Initial Entry subtotal** | **25,966** | **33,943** |
| **Professional Development Input** | | |
| NCOES | 1,139 | 964 |
| Sapper Leader Course | 352 | 380 |
| Officer | 1,184 | 1,018 |
| Warrant Officer | 85 | 103 |
| Drill Sergeant School | 566 | 588 |
| **Professional Development Input subtotal** | **3,326** | **3,063** |
| | | |
| **Total Annual Training Load** | **29,282** | **36,996** |

*Source: Fort Leonard Wood Directorate of Resource Management (FLW, 1995a).*

**Table 4.24:**
**Military Force Structure, Permanent Party Military Personnel**

| Classification | FY95 | FY96 (Projected) |
|---|---|---|
| **Permanent Party** | | |
| Officers | 498 | 490 |
| Warrant Officers | 30 | 34 |
| Enlisted | 3,647 | 3,902 |
| **Permanent Party Total** | **4,175** | **4,426** |

*Source: Fort Leonard Wood Directorate of Resource Management (FLW, 1995a).*

In FY96 the total military and civilian payroll is projected to total $310.7 million from the direct employment of over 4,600 civilian, and 10,741 military personnel (permanent party, and trainees/students adjusted to a full-time annual basis). The military personnel payroll accounted for approximately 12 percent of the total income earned within the nine-county area, and 55 percent of the total income earned in Pulaski County in FY93. In addition, the impact of military retirement income and associated expenditures for goods and services by the approximate 3,000 military retirees within the surrounding 50-mile radius is also an important contributing element to the regional economy. Property values of the buildings/structures, real property and utility systems on the installation approximate $1.17 billion.

### 4.14.4 Shipping

Existing truck and rail loading facilities provide the means of shipping goods and supplies to and from the installation. Truck loading facilities for commercial highway carriers include five flatbed loading ramps and one heavy equipment transporter. The central receiving area is located north of First Street and east of the Engineer School complex. There are also numerous other loading docks constructed for van and trailer loading in the warehouse area of the cantonment.

The Government owned rail system, previously described in subsection 4.7, consists of eighteen on-post spurs and sidings located in the industrial section of the northeast corner of the cantonment. There are a total of ten rail loading ramps. The capacity of the rail yard is 229 rail cars per day without concurrent

truck outloading, and 102 rail cars per day with truck outloading. These capacities translate to 1,603 and 714 rail cars respectively per week assuming seven-day-per-week operations (FLW, 1993c).

## 4.15 QUALITY OF LIFE

### 4.15.1 Unaccompanied Enlisted and Officers Quarters

**4.15.1.1 Unaccompanied Officer Personnel Housing (UOPH).** There are currently 124 UOPH room/suites for permanent party personnel and 568 UOPH rooms/suites for students of transient personnel. Unaccompanied Officer Personnel Housing is located in Sturgis Heights in the extreme southeast portion of the cantonment area, and adjacent to the Engineer School. Additionally, housing in the local community is available for unaccompanied officers. Table 4.25 provides an inventory of existing enlisted and officer barracks spaces on the FLW installation as of October 1995.

**Table 4.25:**
**Unaccompanied Officer and Enlisted Housing Spaces, Fort Leonard Wood**

| | Permanent Spaces | Semi-permanent or Temporary Spaces |
|---|---|---|
| Unaccompanied Officer Personnel Housing | 124 | 0 |
| Unaccompanied Transient Officer Personnel Housing | 215 | 0 |
| Unaccompanied Student Officer Personnel Housing | 353 | 0 |
| **subtotal** | **692** | **0** |
| Unaccompanied Enlisted Personnel Housing | 1,998 | 0 |
| Trainee Housing | 10,946 | 2,894 |
| **subtotal** | **12,944** | **2,894** |
| **Total** | **13,636** | **2,894** |

*Source: Preliminary Power Projection Platform Capital Investment Strategy for FLW (FLW, 1996c)*

**4.15.1.2 Unaccompanied Enlisted Personnel Housing (UEPH).** There are currently 1,998 UEPH and 10,946 trainee barracks spaces classified as permanent on the installation. In addition there are currently 2,894 trainee barracks spaces classified as temporary which were built for the Vietnam-era training. Enlisted barracks are concentrated in a band from the southwest portion of the cantonment northward around both the east and west sides of the centrally located open recreational area. These facilities consist of 68 permanent, 23 semi-permanent and 50 temporary barracks (FLW, 1996c).

**4.15.1.3 Off-Post Housing.** Approximately 28 percent of the permanent party military personnel at FLW live off-post, with one-half owning their own home and the remainder renting either a single family home, apartment or mobile home. According to the FLW Housing Referral Office, approximately 90 percent of the off-post military personnel live in Pulaski County, with Waynesvillle, St. Robert and the surrounding rural unincorporated area being the primary areas of residency. Surveys by the FLW Housing Referral Office indicate that 75 percent of the permanent party military residing off-post live in the Waynesville/St. Robert area, with Rolla in Phelps County and Lebanon in Laclede County being secondary areas of military residency. The fluctuating troop strength and high mobility of the FLW military population has resulted in an inadequate off-post housing supply in the past in respect to housing types, prices and rent levels. One result of this housing supply deficiency has been the significant increase in mobile homes for both purchase and rent. This type of housing has increased by over 60 percent since 1980 within the nine-county region. As indicated in Table 4.26, mobile homes comprise over 20 percent of the housing supply in Pulaski County. Forty percent of all occupied housing units in Pulaski County are renter occupied—a much higher rental occupancy rate than for the region. St. Robert, a primary bedroom community of FLW, has significantly higher rental and mobile home occupancy rates than the nine-county region.

**Table 4.26:**
**Housing Characteristics in the Fort Leonard Wood Region of Influence, 1990**

| | Region of Influence | Pulaski County [1] | St. Robert | Waynesville |
|---|---|---|---|---|
| Total Housing Units | 102,114 | 13,838 | 858 | 1,425 |
| Single Family Units | 73,461 | 8,841 | 280 | 982 |
| Two-Four Family Units | 5,638 | 1,492 | 131 | 149 |
| Multi-Family Units | 5,376 | 565 | 53 | 150 |
| Mobile Homes | 17,639 | 2,940 | 394 | 144 |
| Percent Owner Occupied | 55 | 50 | 37 | 55 |
| Percent Vacant | 9 | 11 | 19 | 10 |
| Percent Seasonal | 14 | 1 | Neg. | Neg. |
| Percent Mobile Homes | 17 | 21 | 46 | 10 |
| Median Value, Owner Occupied. | - | $51,400 | $67,300 | $60,500 |
| Median Monthly Rent | - | $278 | $254 | $251 |

Note: [1] Includes Fort Leonard Wood on-post resident population.

*Source: U.S. Census, 1990.*

According to the Pulaski County Board of Realtors' Multiple Listing Service, there were 308 housing units listed for sale in June, 1995 in Pulaski County, with an average listed price of $61,900 for a 3-bedroom home as illustrated on Table 4.27. A total of 244 single family home sales were recorded in Pulaski County during the twelve-month period ending December 31, 1994, with 60 percent of the sales occurring in the Waynesville/St. Robert area. Approximately 55 percent of the home purchases were financed with Veterans Administration mortgages. The average sales price of a single family home was $66,300 for Pulaski County, and $71,400 for the Waynesville/St. Robert area. The average sales price of a new 3-bedroom/2-bath single family home within the FLW area is approximately $70,500, with prices ranging from $60,000 to $100,000 depending upon location, lot size and amenities.

**Table 4.27:**
**Single Family Homes Listed For Sale, Pulaski County (June, 1995)**

| Size | Number | Average Listed Price ($) | Median Listed Price ($) |
|---|---|---|---|
| 1 Bedroom | 4 | 27,350 | - |
| 2 Bedroom | 35 | 36,160 | 35,000 |
| 3 Bedroom | 195 | 61,900 | 60,000 |
| 4 Bedroom | 53 | 86,375 | 78,500 |
| 5 Bedroom | 21 | 110,685 | 101,500 |
| **TOTAL** | **308** | - | - |

*Source: Pulaski County Board of Realtors, Multiple Listings for Pulaski County, Volume 6, June 8, 1995.*

The South Central Board of Realtors, which comprises primarily Phelps, Dent and Maries counties, reported sales of 534 single family homes for the twelve-month period ending December 31,1994, with 85 percent of the sales occurring in the Rolla and St. James area. The average sales price was approximately $65,000. Approximately 400 single family residences were listed for sale as of June, 1995, according to the South Central Board of Realtors Multiple Listing Service.

A survey of local realtors and apartment owners/managers, representing almost 1,400 apartment units in the Waynesville/St. Robert and Rolla area, indicated a vacancy rate of approximately six percent However, the majority of the vacancies were due to unit rehabilitation, or temporary vacancies caused by external factors such as infrastructure improvements. The survey also included realtors and owners representing approximately 1,000 single family rental properties within the same area. This survey

revealed a three percent vacancy rate for single family rental homes. Residential rental property vacancy rates are lowest within the immediate area of FLW, especially in the Waynesville/St. Robert area. The above survey, in addition to the opinions from local realtors, indicates a rather tight rental housing market in the FLW area, especially for good quality housing.

The above survey also included the collection of information on monthly rent levels. The survey revealed that prevailing monthly rents range between $325-$500 for a three-bedroom house, and between $450-$700 for a four-bedroom house. Average prevailing rents for one and two bedroom apartments range between $200-$300 and $300-$400 respectively, with three bedroom apartments being in very low supply. Location, amenities and inclusion/exclusion of certain utility costs influence housing rental rates, and are primarily responsible for the range of monthly rent levels for a similar size housing unit.

New residential construction within the immediate area of FLW (i.e. Waynesville/St. Robert) has dramatically decreased below the construction level associated with the movement of the U.S. Army Engineer School to FLW in the late 1980s. For example, the City of Waynesville has issued only 42 residential building permits (all single family) in the last 5 years, compared to 160 permits during the 1985-90 period. The City of St. Robert reflects a similar trend in residential building permit issuance during the same time periods. However, most of the new residential construction is occurring within the unincorporated area surrounding Waynesville and St. Robert, an area in which building permits are not required and issued. Thus, no records are available to monitor the trend and level of residential construction occurring within the unincorporated portion of Pulaski County.

In addition to national forces, the local housing supply, prices and rents are influenced by fluctuations in the scale of operations and activities at FLW in addition to housing policies of the installation regarding off-post residency. Local community officials recognize the demands for additional rental apartments, higher priced housing for military officers, and housing for military retirees who prefer to own rather than rent.

### 4.15.2 Family Housing

There are 2,864 family housing units for officers and enlisted personnel in four main family housing areas on the installation. North and South Lieber Heights, located in the northwest portion of the cantonment, consist of 2,249 family units for non-commissioned officers. Piney Hills and Delafield Heights, located in the southeastern cantonment area, comprise 615 family units for officers and enlisted personnel. With the exception of a few single family units for higher ranking officers, all of the family housing consists of two to four bedroom duplexes. Constructed primarily from 1957-63, this housing stock is of wood construction.

Of the above family housing units, 2,256 are currently occupied, with 85 units being temporarily vacant and 523 units having been deactivated (no maintenance). The latter includes 364 units on Indiana Avenue, which were only 50-60 percent occupied when they were deactivated in the spring of 1994. The remaining vacant and deactivated units are scattered throughout the various family housing areas of the installation, Currently, 198 family housing units are included under the Whole House Renovation and Improvement Program, with 29 units having been completed and 169 units under contract for renovation and/or improvement activities.

### 4.15.3 Education

**4.15.3.1 On-Post.** Five elementary schools, with a capacity of 2,000 students, and the Wood Middle School, with a capacity of 800 students, comprise the on-post public school system. These six on-post dependent schools are owned and operated under a permit by the Waynesville R-VI School District. All of these schools are located within or adjacent to the family housing areas.

Pence Elementary School, in the Lieber Heights family housing area, was operated as a child development center in recent years until construction of a new center was completed in July, 1995. The

school has subsequently reverted back to the Waynesville School District and is to be operated as an Early Childhood Center (special education) for three/four-year old children.

The Truman Education Center, in cooperation with colleges and universities, offers off-campus extension courses in a variety of subjects and at all educational levels. The courses range from basic adult education and English to numerous programs leading to bachelors' and masters' degrees. The center is staffed by eight different colleges and universities, including the University of Missouri and Southwest Missouri State University.

**4.15.3.2 Off-Post.** There are six school districts in Pulaski County, with the Waynesville R-VI School District accounting for over 60 percent of the total K-12 school enrollment in the county. There are three off-post Waynesville R-VI District schools, including one elementary school, one middle school, and one high school. Total K-12 enrollment for the Waynesville R-VI School District was 4,674 in May, 1995 reflecting a decrease of 317 students from the previous year. This decrease was entirely the result of military downsizing and associated declining military dependent enrollment. Military dependent children numbered 2,773, or 60 percent of total district enrollment in the 1994/95 school year. When children of Department of Defense civilian employees are added, 70 percent of the Waynesville R-VI School District's enrollment consist of dependents of either military members or Department of Defense civilian employees.

**Table 4.28:**
**Enrollment Trends, Waynesville R-VI School District**

| School Year | Total Enrollment | Military Dependent Enrollment |
|---|---|---|
| 1990/91 | 5,181 | 3,528 |
| 1991/92 | 5,356 | 3,661 |
| 1992/93 | 5,035 | 3,289 |
| 1993/94 | 4,991 | 3,085 |
| 1994/95 | 4,674 | 2,773 |

*Source: Waynesville School District, Business Office, June 1995.*

Enrollment trends generally indicate annual variations of 6 percent or less, and reflect the varying strength of military operations at FLW as illustrated on Table 4.28. Current enrollment levels are below school district capacity. The district recently completed six classroom additions (primarily kindergarten) to the East Elementary School, and has plans for future school additions or new facilities to meet enrollment requirements.

The Waynesville R-VI School District receives Federal Impact Aid (FIA) to help offset the cost of educating military dependent children. These funds have comprised approximately 26 percent of the school district's annual budget in the past, but declined to less than 20 percent for the 1994/95 school year. Federal Impact Aid funds for the 1994/95 school year totaled $3,072,671. In addition, the district continued to receive Department of Defense annual supplemental payments (Section 373, Desert Storm) in the amount of $874,562 for the 1994/95 school year. Because of the concentration of military dependent children, the school districts within Pulaski County received over 98 percent of the total FIA funds distributed within the nine-county region.

The nearest college is the University of Missouri at Rolla, located approximately 28 miles east of the installation. The school, which was founded in 1870 and has an enrollment of approximately 4,500 students, offers undergraduate and graduate programs in numerous engineering and engineering-related areas of study in addition to various liberal arts degrees. In addition, the area is well served by special education and vocational-technical schools.

### 4.15.4 Community Support Service Facilities

Community services are well supported by facilities provided at FLW. A mix of permanent, semi-permanent and temporary facilities are provided. Table 4.29 summarizes community support services facilities by type and square footage.

**Table 4.29:**
**Community Support Service Facilities**

| Facility | Total | Permanent (feet $^2$) | Semi-permanent or Temporary (feet $^2$) |
|---|---|---|---|
| Post Chapel and Unit Chapels | 57,339 | 47,894 | 9,445 |
| Religious Education and Chapel Center Facilities | 20,019 | | 20,019 |
| Community Center | 24,500 | 24,500 | |
| Drug Abuse Center | 1,000 | 1,000 | |
| Post Office, Main | 10,245 | | 10,245 |
| Bank | 13,270 | 13,270 | |
| Skill Development Center | 14,800 | 14,800 | |
| Skill Development Center, Auto | 8,840 | 8,840 | |
| Youth Center | 21,868 | 21,868 | |
| Bowling | 34,160 | 34,160 | |
| Clothing Sales | 10,000 | 10,000 | |
| Commissary | 70,986 | 70,986 | |
| Army Continuing Education | 39,424 | 39,424 | |
| Gymnasium | 188,104 | 188,104 | |
| Indoor Pool | 13,300 | 13,300 | |
| Open Dining NCO | 28,556 | 28,556 | |
| Open Dining Officer | 22,468 | 22,468 | |
| Exchange (Main Store) | 50,994 | 50,994 | |
| Baseball | 2 | | 2 total, area n/a |
| Softball | 17 | | 17 total, area n/a |
| Multi-athletic Field - Football, Soccer | 9 | | 9 total, area n/a |
| Golf Course | 1 | 1 total, area n/a | |
| Skeet Field | 1 | 1 total, area n/a | |

*Source: FLW Master Planning Office, May 1996*

Current projects are planned for the update and diversion of some community support facilities, including unit chapels, religious education and chapel center facilities, the main post office, the bank, and exchange branch facilities. These projects are not related to the BRAC action or required to facilitate any of the action alternative components.

### 4.15.5 Medical Facilities

**4.15.5.1 On-Post.** The General Leonard Wood Army Community Hospital, a highly visible and prominent structure in the north central cantonment, is the largest health care facility within the nine-county area, and is ranked among the largest Army community hospitals. The 500-bed facility, with a 577-bed mobilization capacity, has a 63-bed daily occupancy and offers a full range of medical and dental services to active military personnel, military retirees and dependents. The hospital also operates a family member outpatient clinic, which averages over 1,300 daily patient visits. Troop medical and dental clinics to support initial screening and medical care for active duty military personnel are located near troop housing areas. The hospital offers medical care to civilians from the surrounding communities if, in case of emergency, they cannot be safely transported to other area facilities.

**4.15.5.2 Off-Post.** Off-post medical facilities provide a comprehensive range of primary and secondary health care within the area. There are six hospitals within the surrounding nine-county area, with a total capacity of over 800 beds. The largest of these include the 259-bed Phelps County Regional Medical

- 9 on-post permits,
- 9 off-post permits,
- 17 on-post licenses,
- 6 off-post licenses,
- 30 on-post easements, and
- 10 off-post easements.

Table E.4 in *Final Environmental Assessment of the Master Plan and Ongoing Mission for the U.S. Army Engineer Center and FLW* (FLW, 1995c) lists these leases, permits, licenses and easements. This table also reflects the types of functions covered by each agreement.

### 4.16.2 Service and Maintenance Contracts

The environmental compliance requirements of the service maintenance, grounds maintenance, job order construction, underground storage tank removal, logistics, and refuse collection contracts were obtained. Each of these contracts requires the contractor to establish and maintain proper environmental protection procedures, and to assume liability for compliance with Federal, state and Army environmental requirements.

### 4.16.3 Interservice Support Agreements

The *Final Environmental Assessment of the Master Plan and Ongoing Mission for the U.S. Army Engineer Center and FLW* (FLW, 1995c) reviewed a total of 100 Interservice Support Agreements files, including 47 files which identified the level of support to be provided by FLW to a tenant, and 53 files which either dealt with support to units that are not located at FLW or which had expired. The 47 files which included Interservice Support Agreements for units which would be supported at FLW were reviewed to identify the type of support required and the associated potential for environmental impacts. Each of the fifteen mission activity groupings (listed in Table B.1 of Volume III, Appendix B) are illustrated to indicate direct involvement in the area.

# Section 5
# ENVIRONMENTAL CONSEQUENCES

# Section 5: Environmental Consequences

## 5.1 INTRODUCTION

### 5.1.1 Resource Evaluation Categories

Fifteen natural, cultural, sociological and economic resource categories (as presented in Section 4) were established to provide a framework for the identification of baseline conditions. These same categories, plus an "operational efficiency" category, have been used to analyze and describe the effects of the Army's proposed BRAC action and associated alternatives. The categories were developed based on a review of installation resources, applicable resource protection laws and regulations, and comments received from the public and resource agencies during the Environmental Impact Statement (EIS) scoping process. The resource categories include:

- Land Use and Training Areas;
- Air Quality and Climate;
- Noise;
- Water Resources (including, Floodplains, Surface Water and Hydrogeology/Groundwater);
- Geology and Soils;
- Infrastructure;
- Hazardous and Toxic Materials;
- Munitions
- Permits and Regulatory Authority;
- Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources);
- Cultural Resources;
- Sociological Environment;
- Economic Development;
- Quality of Life (including Human Health and Safety);
- Installation Agreements; and
- Operational Efficiency.

### 5.1.2 Impact Analysis Process

This Section (Section 5 in total) documents a **four-step process** that was used to identify the anticipated effects of proposed BRAC actions and related alternatives. Figure 5.1 has been provided to summarize these four major steps which include:

- **Step 1: Training Mission Impact Analysis.** An analysis of impacts associated with alternatives for realigning the Military Police School and Chemical School missions to FLW as shown in subsection 5.2.

- **Step 2: Support Facility Impact Analysis**. An analysis of impacts associated with alternatives for providing facilities required to accommodate the realigned missions and associated training goals as shown in subsection 5.3.

- **Step 3: Population Impact Analysis**. An analysis of impacts associated with the phased realignment of personnel (military and civilian positions) as shown in subsection 5.4.

- **Step 4: Cumulative Impact Analysis & Mitigation.** An analysis of the cumulative effects of the proposed action as defined in subsection 5.1.3.3 below, and related mitigation requirements as shown in subsection 5.5.

A discussion of each of these analysis steps is provided below:

- **Step 1** (items 2 through 6 as shown on Figure 5.1) provides an analysis of the training mission alternatives identified in subsection 3.3.3 of the EIS. Subsection 3.3.1 addresses the No Action Alternative as it relates to the realignment of training activities, and why this alternative is not viable. Subsections 5.2.2, 5.2.3 and 5.2.4 provide an analysis of each of the remaining training alternatives, including the Relocate Current Practice (RCP), Optimum Training Method (OPTM) (Army's Proposed Action) and Environmentally Preferred Training Method (EPTM) Alternatives.

  As shown in Figure 5.1, each of these training alternatives are evaluated in the context of each of the three implementation Land Use and Facility plans. This approach was required since it is not possible to identify the impacts of training activities without relating the activities to specific training locations. This approach provides the most flexibility in terms of considering all possible combinations of training alternatives in association with each land use and facility location alternative.

  As illustrated in Figure 5.1, the results of the analysis for each subsection are provided in narrative format. In addition, a summary table has been included at the end of each subsection to provide an overview of significant impacts under each scenario. Furthermore, Impact Matrices (1 through 3) have been included in Volume II to provide a graphic summary of the type and extent of all impacts which have been identified. These impact matrices may be used in association with the narrative provided in this volume to help the reader follow the analysis. Step 1 concludes with a summary and conclusions associated with the Step 1 training mission analysis, and explains the rationale for elimination of the RCP Alternative from further consideration.

- **Step 2** (items 7 through 11 as shown on Figure 5.1) provides an analysis of each of the BRAC land use and facility location alternatives identified in subsection 3.3.4 of the EIS. Subsection 3.4.1 addresses the No Action Alternative as it relates to providing required support facilities, and why this alternative is not viable. Subsections 5.3.2, 5.3.3 and 5.3.4 provide an analysis of each of the remaining land use and facility location alternatives, including the Army's Proposed Land Use (LU) and Facility Plan (FP) Combined Headquarters and Instruction (CH&I), Alternative 1 LU & FP (Combined Headquarters (CH)), and Alternative 2 LU & FP (Separate Headquarters (SH)).

  As illustrated in Figure 5.1, the results of the analysis for each subsection are provided in narrative format. In addition, a summary table has been included at the end of each subsection to provide an overview of significant impacts for that alternative. Furthermore, Impact Matrices (4 through 6) have been included in Volume II to provide a graphic summary of the type and extent of all impacts which have been identified. These impact matrices may be used in association with the narrative provided in this volume to help the reader follow the analysis. Step 2 concludes with a

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |



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summary and conclusions associated with the Step 2 BRAC land use and facility analysis, and explains the rationale for elimination of the Alternative 2 LU & FP (SH) from further consideration.

- **Step 3** (items 12 through 13 as shown on Figure 5.1) provides an analysis of the realignment of the BRAC-related population to FLW (as described in subsection 3.3.5). Subsection 3.5 addresses the No Action Alternative as it relates to the population realignment, and why this alternative is not viable. Subsection 5.4.2 provides an analysis of the only viable and reasonable implementation plan which has been identified as the "Phased Move" Alternative.

- **Step 4** (items 14 through 18 as shown in Figure 5.1) provides an analysis of the cumulative impacts of implementing all planned BRAC actions (including conducting training, providing support facilities and relocating the population) using combinations of implementation alternatives. Therefore, subsection 5.5.1 evaluates the cumulative impact of implementing the OPTM (Army's Proposed Action) Alternative, the Army's Proposed LU & FP (CH&I), and the Phased Move of population. The reader may refer to the titles of the remaining cumulative impact subsections (5.5.2, 5.5.3, and 5.5.4) to identify the remaining possible combinations that are analyzed in the document. The final element of the analysis (shown as item 18 on Figure 5.1), provides a summary table which identifies significant impacts associated with each cumulative implementation scenario and related mitigation actions. In addition, the rationale for the selection of the Army's total proposed action is presented. Subsection 5.1.3.3 below provides additional information regarding the analysis of cumulative impacts as presented in this EIS.

A modified version of Figure 5.1 has been included on each of the divider sheets that have been placed between each of the four analysis steps in Section 5 to help orient readers to the material presented.

## 5.1.3 Definition of Key Terms

The following paragraphs define key terms used throughout this section.

**5.1.3.1 Direct Versus Indirect Impacts.** The terms impact and effect are synonymous as used in this EIS. Impacts may be determined to be beneficial or adverse, and may apply to the full range of natural, aesthetic, historic, cultural, and economic resources of the installation and its surroundings. Definitions and examples of direct and indirect impacts as used in this document are as follows:

- **Direct Impact**. A direct impact is caused by the proposed action, and occurs at the same time and place.

- **Indirect Impact**. An indirect impact is caused by the proposed action and is later in time or farther removed in distance, but is still reasonably foreseeable.

- **Application of Direct Versus Indirect Impacts**. For direct impacts to occur, a resource must be present in a particular area. For example, if highly erodible soils were disturbed due to construction, there would be a direct impact to soils from erosion at the construction site. Sediment laden runoff would indirectly affect water quality in adjacent areas downstream from the construction site.

**5.1.3.2 Short-Term Versus Long-Term Impacts.** In addition to indicating whether impacts are direct or indirect, the impact matrix summaries provided in Volume II also distinguish between short-term (S) and long-term (L) impacts. In this context, short-term and long-term do not refer to any rigid time period and are determined on a case-by-case basis in terms of the environmentally significant consequences of the proposed action. Where both short-term and long-term impacts are expected to occur, this fact is discussed in the corresponding text narrative, but only the long-term symbol (L) is shown on the evaluation impact matrices.

**5.1.3.3 Cumulative Impacts.** Cumulative effects are defined as the impacts on the environment which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. The specific methodology used to evaluate cumulative effects is presented in subsection 5.5 of this FEIS.

**5.1.3.4 Significance.** The term "significant" as used in National Environmental Policy Act (NEPA) requires consideration of both the context and intensity of the impact evaluated. Significance can vary in relation to the context of the proposed action. For the proposed action, context may include consideration of effects on a national, regional, and/or local basis. Both short-term and long-term effects may be relevant. Impacts are also evaluated in terms of their intensity or severity. Factors contributing to the intensity of an impact include:

- The degree to which the action affects public health or safety;
- The proximity of the action to resources which are legally protected by various statutes and regulations such as wetlands, sites and buildings listed on or eligible for the National Register of Historic Places, regulatory floodplains, and Federally-listed Threatened and Endangered (T & E) species (including "may affect" findings on T & E species);
- The degree to which the effects of the action on the quality of the human environment are likely to be highly uncertain or controversial;
- Whether the action is related to other actions that are individually insignificant but cumulatively significant; and
- Whether the action threatens to violate Federal, state or local law imposed for the protection of the environment.

Where significant impacts are identified in this EIS, the rationale associated with such designation is provided as part of the impact analysis narrative.

**5.1.3.5 Mitigation.** Where "significant" adverse impacts are identified, this document describes (in subsection 5.5) measures that will be implemented by the Army to mitigate these effects, in addition the Army has also included mitigation measures to eliminate or reduce the impact of the other (non-significant) adverse impacts. Mitigation strategies generally include the following best management practices which are presented in the preferred order for implementation.

1) Avoiding the impact altogether by stopping or modifying the proposed action;
2) Minimizing impacts by limiting the degree of magnitude of the action and its implementation;
3) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;
4) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment; or
5) Compensating for the impact by replacing or providing substitute resources.

In this EIS, Army mitigation commitments are limited to those associated with significant adverse impacts associated with the Army's proposed actions. Army mitigation measures taken to reduce or avoid significant impacts associated with the Army's "preferred" action will also be included in the ROD which will be prepared after the close of a 30-day waiting period after publication of the Final EIS. Only those mitigation measures that are practicable (i.e., can be accomplished using existing technology with a reasonable commitment of resources) have been identified. In addition to the Army's major mitigation commitments, FLW will continue to use a wide range of ongoing environmental management programs,

Standard Operating Procedures (SOPs), monitoring programs and permit compliance procedures to minimize the type and magnitude of adverse impacts identified in this EIS. However, under any circumstance, FLW will adhere to all permit conditions in effect at the time training occurs.

## 5.1.4 Assumptions and Environmental Controls

The analysis of anticipated environmental impacts associated with the implementation of the proposed action has been based upon the following assumptions:

- that all realigned activities will comply with Federal, state and local laws, and Army regulations; where proposed training activities exceed existing permits, the impacts of the proposed training have been evaluated even though training will not exceed existing permits unless new permits are obtained;

- that existing ongoing environmental conservation, management, and restoration programs at FLW would continue, including existing environmental monitoring programs performed by DPW as delineated in Volume III, Appendix H of the EIS;

- that the construction environmental control features listed in subsection 5.1.4.1 are incorporated into the appropriate construction projects;

- that the design features listed in subsection 5.1.4.2 are incorporated into each of the training and construction management actions; and

- that the T & E species management (design) features listed in subsection 5.1.4.3 are incorporated into each of the training goals, construction projects and ongoing environmental management program of the installation.

These assumptions were included in the analysis based on prior and ongoing involvement of the FLW DPW Environment, Energy and Natural Resources Division. The involvement of this staff in the development of the initial plans, formulation of the environmental analysis, review of initial environmental studies and formulation of training implementation alternatives resulted in an interactive design process in which training methods and alternative construction sites were selected to reduce or eliminate environmental concerns.

**5.1.4.1 Construction Environmental Controls.** Initial planning for the relocation of the Military Police School and the Chemical School identified that in order to ensure compliance with Federal, state, local and Army regulations new construction projects would need to include measures to reduce potential environmental impacts associated with the initial construction effort and the long-term operation of the facilities. Measures identified as part of this effort are included in all of the alternative training methods considered (as discussed in subsection 5.2) and all of the alternative land use and facility plans considered (as discussed in subsection 5.3). These construction environmental control features include:

1) Vegetation and structural erosion control practices will be constructed and maintained according to standards and specification of the State of Missouri, Department of Natural Resources (MDNR), and/or the U.S. Environmental Protection Agency (USEPA) document entitled *Storm Water Management for Construction Activities.*

2) Construction will follow Missouri Clean Water regulation requirements for construction activities.

3) All erosion and sediment control measures are to be in place prior to, or as the first step in construction.

4) All areas disturbed by construction activities shall be seeded or sodded and fertilized unless the area is to be paved or built upon.

5) Clearing and grubbing will be sequenced with construction to minimize the exposure time of cleared surfaces. These activities should not be conducted during periods of wet weather.

6) Construction activities will be staged to allow for the stabilization of disturbed soils.

7) Erosion and sediment control measures will be maintained during the construction effort, and until vegetation has recovered in a manner to ensure compliance with Missouri Clean Water regulations.

- **Implement Erosion Control Measures During Construction.** Fort Leonard Wood will implement erosion control measures in coordination with normal construction practices required by the US Army Corps of Engineers (COE) for all construction projects (including those accomplished by civilian contractors and government personnel). However, as the construction contract general provisions do not state specific methods that must be used to meet the soil erosion control provisions, performance requirements will be implemented. Costs associated with the erosion control plans are included in the funded construction program.

- **Reestablishment of Vegetative Cover.** Provisions for the reestablishment of both temporary and permanent vegetative cover in areas that will be cleared during construction (through plantings, seed or sod) will be included in all construction projects. Landscaping of construction sites will be accomplished through the use of both native and ornamental plants, although an emphasis will be placed on use of native plantings. This effort will include: the removal and stockpiling of top soil, spreading top soil after construction, mulching all seeded areas, and use existing natural features for landscaping at construction sites.

- **Surface Water Controls.** Provisions for surface water control, including the construction of drainage swales, and both temporary and permanent surface water retention and control ponds, will be provided where required by Missouri implementation of the Clean Water Act. Surface water retention and control ponds will provide sediment control as required to reduce the potential for sediment being transported from construction and training sites and into surface water resources.

- **Stormwater Runoff Controls.** Curbs, gutters, catchment basins, and drop inlets will be used at new paved and building areas as necessary to control storm water runoff.

- **Reconstruction of Existing Infrastructure.** Where the existing infrastructure is inadequate to support proposed development the construction project will include:

  1) the reconstruction of existing paved and all season access roads leading to project sites;

  2) the reconstruction or realignment of installation roadways to ensure the smooth flow of traffic following completion of construction efforts;

  3) the reconstruction, expansion or extension of utility service systems including communication, electrical, water and natural gas service systems; and/or

  4) the reconstruction, expansion or extension of sanitary sewage and storm sewage collection systems.

**5.1.4.2 Training Activity Environmental Controls.** Initial analysis of training requirements identified that regardless of the location where several Training Goals (TGs) would occur the Optimum Training Method (OPTM) (Army's Proposed Action) and Environmentally Preferred Training Method (EPTM) Alternatives would need to include environmental controls designed to reduce the level of impact

that would result from the training. These training activities and the controls identified which would be implemented under the OPTM (Army's Proposed Action) or EPTM Alternatives are outlined below.

- Training Goal 1.2 Maneuver Operations; TG 2.1 BIDS Employment and Operation; TG 3.1 FOX Battlefield Employment; TG 7.3 Obscurant Employment Operations, Mobile; TG 7.4 Obscurant Employment Operations, Field; and TG 11.1 Vehicle Operations, Driver Qualification will involve the operation of vehicles in-stream crossings or in-lake operations. These operations may redistribute sediment and damage stream banks causing an increase in suspended solids, and wash vehicle contaminants such as oils, grease or fluids off the vehicles into surface water bodies. As part of an initial review of these training requirements, FLW identified that the magnitude of the potential redistribution of sediment and damage to stream banks could be greatly reduced by restricting in-stream crossings to only improved locations. Improved stream crossings could include locations where the streambed is hardened, streambanks have been stabilized, culverts installed, cable-concrete matt installed, or large limestone rock placed to limit the potential for sediment redistribution. Crossings will be designed based on water flow, type of traffic and expected frequency of traffic, and will not affect or alter the streambed elevation and gradient upstream or downstream. These elevations will be maintained to allow upstream and downstream passage of aquatic organisms.

  Implementation of the management restriction that in-stream crossings only occur only at improved locations will require the replication of an initial high mobility multipurpose wheeled vehicle (HMMWV) stream crossing training area as part of the HMMWV driving course. Obstacles included in the driving course will include water filled concrete-lined pit, a concrete-line pit filled with sand, and one filled with mud.

- Training Goal 1.2 Maneuver Operations; TG 2.1 BIDS Employment and Operation; TG 3.1 FOX Battlefield Employment; TG 7.3 Obscurant Employment Operations, Mobile; TG 7.4 Obscurant Employment Operations, Field; and TG 11.1 Vehicle Operations, Driver Qualification will also involve off-road vehicle maneuvers by wheeled and tracked vehicles. These operations may damage vegetative ground cover and soil structure, and subsequently lead to soil erosion. In an effort to limit the potential damage associated with this type or training, FLW has designated specific portions of the larger training areas for off-road activities. These areas will be, for the most part, on the broad upland ridges which have a lower erosion potential. At some training areas, sedimentation basins have been identified and will be designed onto the initial project for Range Modifications (Project 46094) to contain and minimize soil losses from the area. However, the specific location for these impacts can not always be anticipated. As part of FLW's Land Rehabilitation and Maintenance (LRAM) program, soil and vegetation disturbance on these training areas will be monitored to determine requirements for additional erosion control. Funding for these maintenance activities will be programmed annually to allow prompt attention to problem areas, and training will be limited in problem areas until corrective actions have been made in order to limit the potential for additional erosion. Site specific plans developed by the Natural Resources Conservation Service in cooperation with the FLW DPW Natural Resources Branch for existing training areas have proved both operationally and cost effective.

- Training Goal 1.3 Mines and Obstacles to Prevent Movement, will include modifications in both training methods and construction features at the training area. Training methods will be modified to allow for a reduction in the amount of fuel used in each of the four types of Flame Field Expedient (FFE) deterrents training. The FFE deterrents training will also be modified to include the use of professionally-developed video tapes that illustrate the magnitude and physical characteristics of FFE weapons, thereby allowing a more thorough review of explosions from various angles and in slow motion, with less field training. The design of the training area will include:

  1) the construction of a protective barrier under the expedient wall-of-flame training area to reduce the potential for unburned fuel to contaminate surface or groundwater;

2) construction of earthen berms around the entire FFE deterrents training site to prevent upstream surface water from entering the training area; and

3) the construction of clay-lined collection ponds to gather and hold runoff that occurs within the bermed FFE deterrents training area.

Each of these design features represents an improvement in environmental control features when compared to the RCP Alternative.

- Training Goal 2.2 BIDS Maintenance; TG 3.2 FOX Maintenance; TG 7.5 Obscurant, Generator Maintenance; and TG 11.3 Vehicle Maintenance will be modified to restrict hands-on vehicle and equipment training to outdoor areas designed to control surface water runoff. Control of the surface water runoff is desired because the training involves the use of oil, hydraulic fluid, or other fluids that could be inadvertently spilled. Conducting the training in an area that has proper environmental control for surface water runoff and using procedures specified in the Installation Spill Prevention and Response Plan (Radian, 1994) will help collect and contain fluid that might be inadvertently spilled and released into the environment.

- Training Goal 6.1 NBC Procedures; TG 6.4 NBC Survival Recovery; and TG 8.1 Radiation Safety, will be modified to restrict training with unsealed radiological isotopes to a classroom/laboratory environment.

- Training Goal 6.3 NBC, Decontamination, Advanced Proficiency Test (Toxic Agent) will restrict toxic agent training to a facility that is specifically designed and constructed to support this type of training. The facility (much like the existing facility at FMC) would include negative air pressure training bays; entry vestibules; visual monitoring systems; air monitoring systems which monitor air exhaust streams to ensure that toxic agents do not exceed standards; and automatic backup power systems which will provide electrical power during power outages. The facility will also be designed to capture any water used for firefighting to prevent inadvertent contamination of the surrounding area.

- Training Goal 7.2 Obscurant, Employment Operations Basic (Static); TG 7.3 Obscurant, Employment Proficiency Test (Mobile Operations); and TG 7.4 Obscurant, Employment Proficiency Test (Field Training Exercises) will be restricted at all times for fog oil use by Missouri Department of Natural Resources Air Permit (#0695-010). The permit restricts both the daily and annual quantity of fog oil use. Record keeping requirements are an integral part of the air permit, including the daily and annual use of fog oil, to ensure compliance with the air permit. The permit specifies training may only be conducted during certain meteorological conditions, air stability classes, and wind directions depending on the training location. The Army's current plan is to not use additives in the fog oil when the temperature drops below 32 degrees fahrenheit. Two heated buildings will be constructed to keep fog oil warm so the viscosity is low enough to support training. The installation is required to conduct ambient air monitoring pre- and post-training for both particulate matter (less than 10 microns) and ozone. Soil and vegetation monitoring will also be conducted. The permit prohibits visible smoke off post. During training, FLW will have personnel monitor smoke movement. They will be in communication with the operators, and smoke training activities will be stopped if necessary to ensure that visible smoke does not migrate off the installation.

- Training Goal 7.6 Obscurant, Storage Operations would be performed at covered and contained storage buildings per the Installation Spill Contingency Plan storage areas versus an open storage area similar to the ones included in the RCP Alternative. The covered storage areas will prevent the accumulation of rainfall, snow and ice near the fog oil drums; thereby reducing the potential for accidents during the movement of drums and the potential for drums to deteriorate during storage. The storage areas would also include sloped floors allowing for the containment and cleanup of any oil that might be inadvertently spilled.

**5.1.4.3 Threatened and Endangered Species Management.** As part of the U.S. Fish and Wildlife Service (USFWS) consultation process, a *Biological Assessment: Relocation of U.S. Army Chemical School and U.S. Army Military Police School to FLW, Missouri* (FLW, 1997), was prepared to evaluate impacts of the proposed action to Federally listed threatened and endangered species at FLW. The following design features have been incorporated in the development of the Biological Assessment. Impact analyses include these management practices in the proposed action but does not include Reasonable and Prudent Measures (RPMs) issued with the Biological Opinion (BO) (USFWS, 1997b). Additional information concerning management practices and RPMs included in the BO are provided in subsection 5.5. Design features identified by FLW and included in the analysis of impacts require that FLW will:

- **Continue Existing Management Practices.** Fort Leonard Wood has established, in coordination with the USFWS, a series of management practices. Procedures established in FLW regulation 210-14 (FLW, 1993a) and the *Biological Assessment for Indiana Bats, Gray Bats, and Bald Eagles at Fort Leonard Wood, Missouri* (FLW, 1996e) describe these management practices in detail.

  Additionally, it is stressed that FLW will continue current environmental monitoring activities. This monitoring is required to ensure compliance with existing permits issued by both the Federal government and the State of Missouri. Additional information concerning the number, type and monitoring requirements associated with each permit are contained in Volume III, Appendix H of the EIS.

- **Design and Implement a Biomonitoring Program.** Fort Leonard Wood will design and implement a bio-monitoring program evaluating assessment of potential toxicological impacts of the BRAC action. This program will be implemented prior to the start of BRAC operations and training activities. Under the biomonitoring program, impacts will be assessed and addressed following recommendations of the USFWS.

- **Establish Bat Management Zones.** Transient gray bats utilize Freeman Cave. Recent information indicates that Freeman Cave may be a gray bat maternity site (FLW, 1997). Because the extent of use of Freeman Cave by gray bats was not previously known, Bat Management Zones (established for other caves known to be used by Indiana and gray bats on the installation) were not established for Freeman Cave. As part of the proposed action, Bat Management Zones, similar to existing restrictions, will be established for Freeman Cave. Fort Leonard Wood will establish three bat management zones around Freeman Cave to limit potentially harmful activity near the cave. Within management zones, disturbance from certain training activities (e.g. small arms/weapons) and other human activity is controlled. Limits on activities within these management zones will be identical to those currently in force for Saltpeter No. 3 Cave.

  1) **Establish a Restricted Zone.** Freeman Cave will be off-limits for military operations and training. No development will occur in the 20 acre area (162 meter radius) surrounding the cave. Foot maneuvers are allowed. The use of smoke, CS (Tear) gas, pyrotechnics, or noise simulators are not allowed within the restricted zone between 1 April and 30 October.

  2) **Establish Management Zone 1.** The area located between 162 meters and 457 meters from Freeman Cave (approximately 160 acres) will be managed in a manner similar to that of the other Bat Management Zones already established at FLW. No bivouac, smoke, CS (tear) gas, or use of noise simulators is permitted between 1 hour before sunset to one hour after sunrise. This restriction applies between 1 April and 30 October. Foot maneuvers are permitted year-round. Development of training facilities and sites will be given low priority within Zone 1.

  3) **Establish Management Zone 2.** The area located between 457 meters and 1,932 meters from Freeman Cave will be managed in a manner similar to that of the other Bat Management Zones already established at FLW. Disruptive activities will be given a low priority or

restricted. Training activities resulting in loss of forest canopy must be approved by the FLW Directorate of Public Works (DPW), Natural Resources Branch.

- **Establish Landscape-Scale Forest Management Policy.** Fort Leonard Wood will develop and implement guidance for forest management activities. The guidelines will describe management to maintain or enhance the quality of forest on the installation for endangered bats. Within one year of receiving the Biological Opinion (from the USFWS) regarding this assessment, FLW will produce a written policy committing to conduct forest management practices in accordance with the new guidelines. The policy statement will specify a two-year schedule to meet the following objectives.

  1) Assess current forest conditions on the installation. Fort Leonard Wood will determine the current amount, types and condition of forest on the installation.

  2) The installation will describe a desired future condition for forest habitat on the installation. The installation desired future condition, consistent with the military mission, will incorporate habitat requirements of endangered bats on a landscape-scale.

  3) Utilize the best available data concerning seasonal habitat requirements of Indiana bats and gray bats to develop standards and guidelines for forest management practices on the Installation.

  4) Identify unique sites such as areas near certain caves and riparian areas that require protection or special management considerations. Develop management guidelines for identified unique sites.

  5) Identify important habitats such as riparian areas along existing open or narrowly wooded drainages that may be conducive to establishing natural vegetative areas.

  Fort Leonard Wood will coordinate with the USFWS in developing and meeting these objectives. Fort Leonard Wood will submit annual reports to the USFWS documenting forest management actions and compliance with established standards and guidelines.

- **Implement Erosion Control Measures During Construction.** Fort Leonard Wood will implement erosion control measures in coordination with normal construction practices for these actions as specified in 5.1.4.1 above, and in future construction activities at the installation.

# SUBSECTION 5.2.2

# Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| 3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)<br>Training Alternatives: RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative →, OPTM Alternative (Army's Proposed) →, EPTM Alternative →<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative →, OPTM Alternative (Army's Proposed) →, EPTM Alternative →<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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# 5.2 STEP 1 - REALIGN TRAINING MISSION IMPACT ANALYSIS

Table 5.1 provides an outline of the analysis structure used in subsections 5.2.2 through 5.2.4. This table may be used by readers to locate and review topics of most interest to them, and to help visualize the organizational structure of the Step 1 analysis.

**Table 5.1:**
**Matrix Display of Step 1 (Subsections 5.2.2 through 5.2.4) Training Analysis Subsection Numbers**

| Subsection or Impact Analysis Categories | Subsection Numbers - Training Alternatives in Association with Army's Proposed LU & FP (CH&I) (Subsection 5.2.2) | Subsection Numbers - Training Alternatives in Association with Alternative 1 LU & FP (CH) (Subsection 5.2.3) | Subsection Numbers - Training Alternatives in Association with Alternative 2 LU & FP (SH) (Subsection 5.2.4) |
|---|---|---|---|
| Introduction | 5.2.2.1 | 5.2.3.1 | 5.2.4.1 |
| Land Use & Training Areas | 5.2.2.2 | 5.2.3.2 | 5.2.4.2 |
| Air Quality and Climate | 5.2.2.3 | 5.2.3.3 | 5.2.4.3 |
| Noise | 5.2.2.4 | 5.2.3.4 | 5.2.4.4 |
| Water Resources | 5.2.2.5 | 5.2.3.5 | 5.2.4.5 |
| Floodplains/Surface Water | 5.2.2.5.A | 5.2.3.5.A | 5.2.4.5.A |
| Hydrology/Groundwater | 5.2.2.5.B | 5.2.3.5.B | 5.2.4.5.B |
| Geology and Soils | 5.2.2.6 | 5.2.3.6 | 5.2.4.6 |
| Infrastructure | 5.2.2.7 | 5.2.3.7 | 5.2.4.7 |
| Hazardous/Toxic Materials | 5.2.2.8 | 5.2.3.8 | 5.2.4.8 |
| Munitions | 5.2.2.9 | 5.2.3.9 | 5.2.4.9 |
| Permits/Regulatory Authority | 5.2.2.10 | 5.2.3.10 | 5.2.4.10 |
| Biological Resources | 5.2.2.11 | 5.2.3.11 | 5.2.4.11 |
| Federal T & E Species | 5.2.2.11.A | 5.2.3.11.A | 5.2.4.11.A |
| Other Protected Species | 5.2.2.11.B | 5.2.3.11.B | 5.2.4.11.B |
| Wetlands | 5.2.2.11.C | 5.2.3.11.C | 5.2.4.11.C |
| Aquatic Resources | 5.2.2.11.D | 5.2.3.11.D | 5.2.4.11.D |
| Terrestrial Resources | 5.2.2.11.E | 5.2.3.11.E | 5.2.4.11.E |
| Cultural Resources | 5.2.2.12 | 5.2.3.12 | 5.2.4.12 |
| Sociological Environment | 5.2.2.13 | 5.2.3.13 | 5.2.4.13 |
| Economic Development | 5.2.2.14 | 5.2.3.14 | 5.2.4.14 |
| Quality of Life | 5.2.2.15 | 5.2.3.15 | 5.2.4.15 |
| Quality of Life | 5.2.2.15.A | 5.2.3.15.A | 5.2.4.15.A |
| Human Health and Safety | 5.2.2.15.B | 5.2.3.15.B | 5.2.4.15.B |
| Installation Agreements | 5.2.2.16 | 5.2.3.16 | 5.2.4.16 |
| Operational Efficiency | 5.2.2.17 | 5.2.3.17 | 5.2.4.17 |
| Summary | 5.2.2.18 | 5.2.3.18 | 5.2.4.18 |

*Source: Harland Bartholomew & Associates, Inc.*

## 5.2.1 ANALYSIS OF NO ACTION TRAINING ALTERNATIVE

The reader should refer to subsection 3.3.1 for a discussion of this alternative, and the rationale for eliminating the No Action Training Alternative from further evaluation.

## 5.2.2 ANALYSIS OF TRAINING ALTERNATIVES IN ASSOCIATION WITH THE ARMY'S PROPOSED LAND USE AND FACILITY PLAN (Combined Headquarters and Instruction)

### 5.2.2.1 Introduction

The process used to evaluate impacts in this subsection has been described in applicable parts of subsection 5.1 above. Other items that should be understood in reviewing this section include:

- The narrative impact discussions are provided in subsections 5.2.2.2 through 5.2.2.17. These discussions are organized according to the resource categories presented in Section 4 (Affected Environment) and as listed in Table 5.1 above.

- Pertinent analysis "issues" are listed at the beginning of each resource category discussion. Impacts relating to the issue under consideration are then presented for each training alternative which include the Relocate Current Practice (RCP), Optimum Training Method (OPTM) (Army's Proposed Action) and the Environmentally Preferred Training Method (EPTM) Alternatives.

- Where the impacts of the alternatives are identical or very similar, a single subsection is provided to address the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives. However, where differences in impacts occur, separate subparagraph headings are used to organize the discussion and facilitate an understanding of the differences that occur under each alternative.

- Impact Matrix No. 1 has been included in Volume II to provide a graphic summary of the type and extent of all impacts which have been identified in this subsection. The reader is encouraged to refer to the matrices along with the narrative discussions.

- Subparagraph 5.2.2.18, at the end of the narrative description, provides a summary of the impacts associated with implementing the three training method alternatives (RCP, OPTM (Army's Proposed Action) and EPTM Alternative) at the locations specified by the Army's Proposed Land Use (LU) and Facility Plan (FP) Combined Headquarters and Instruction (CH&I).

### 5.2.2.2 Land Use & Training Areas

Implementation of the planned training objectives of the Military Police School and Chemical School at the locations specified in the Army's Proposed LU & FP (CH&I) at FLW will affect the following factors under this resource category:

- Reallocation of existing land use areas; and
- Establishment of a new buffer area surrounding the Chemical Defense Training Facility (CDTF).

**5.2.2.2.1 Issue: *Reallocation of Existing Land Use Areas.*** Implementation of BRAC actions will result in increased demands for training facilities and areas, and the movement of training and mission related activities that were unforeseen during the development of the existing Master Plan/Land Use Plan for FLW (FLW, 1991c). These activities will increase the demand for:

- training facilities including general instruction classrooms, interior and exterior training areas, weapons qualification and familiarization ranges, computer laboratories, communications laboratories, simulation laboratories, maintenance training area, as well as other unique instruction areas; and

- other support facilities including administrative, community support, unaccompanied and accompanied housing, industrial, medical, operational and recreational areas.

Although the existing Master Plan/Land Use Plan included areas for expansion within the established land use zones, these zones were sized based on potential changes in mission that were anticipated at the time the plan was developed. As the proposed BRAC action was not identified at the time of the Master Plan, the zones were not sized to accommodate the required activities and spatial requirements associated with the realigned missions being assigned to FLW. Implementation of any one of the three alternative training methods (RCP, OPTM (Army's Proposed Action) and EPTM Alternatives) will have similar impacts on existing land use areas.

- **Direct Impacts.** Implementation of the Army's Proposed LU & FP (CH&I) will not require any change in the land use pattern for the non-cantonment training areas. Existing non-cantonment training areas will remain in use for training, and no additional areas will be converted to this land use; even though the type of training conducted at several of the training areas will change. All of these changes are compatible with nearby training activities.

  Implementation of the Army's Proposed LU & FP (CH&I) will result in the following changes to the existing, approved land use plan (for approximately 229.3 acres) within the cantonment (built-up) area of the installation:

  - expansion of an existing troop housing area east of Lincoln Hall to the north and west (approximately 74 acres);
  - adjustment of an existing reserved/buffer area to separate the expanded troop housing area near Lincoln Hall from the surrounding training land use area (approximately 22.5 acres);
  - conversion of the existing family housing area along Indiana Avenue to troop housing for Unaccompanied Enlisted Personnel Housing (approximately 77 acres);
  - conversion of an existing industrial area west of the 800-area barracks to training area (approximately 53 acres); and
  - conversion of a recreation area to community facilities land use northeast of the intersection of Jordan Road and South Dakota Avenue (approximately 2.8 acres).

  An illustration showing the location and size of these areas is provided on Figure 3.2, Army's Proposed LU & FP (CH&I) which is located in Section 3 of the EIS. Each of these land use changes within the cantonment is compatible with the existing land uses in the area. Conversion of the area north of Lincoln Hall to troop housing, conversion of the area west of the 800-area barracks to training, conversion of the troop housing area along Indiana Avenue to troop housing, and the conversion of the area near the intersection of Jordan Road and South Dakota Avenue will have a beneficial impact on the overall land use pattern of the installation. The determination of beneficial impact is based on the use of criteria established in the Master Plan (FLW, 1991c) which stated that a primary goal of the Master Plan was to improve "...functional efficiency by locating interrelated activities in proximity to one another, and separating incompatible activities from one another..." Likewise, alteration of the buffer area north of Lincoln Hall will be beneficial as it will "...provide an attractive built environment..." Location of the introductory training on BIDS and FOX vehicles near the existing 800-area maintenance facilities provides a positive, synergistic relationship between the training and industrial land use functions.

- **Indirect Impacts.** Conversion of the area north of Lincoln Hall into troop housing requires the relocation of an existing recreational area which contains two soccer fields and two softball fields. The two soccer fields will be replaced with new fields constructed at the site currently occupied by

building 2510 and 2516. These buildings are located north of First Street, east of the intersection of Nebraska Avenue and First Street. Both buildings are currently scheduled for demolition under separate actions planned by the installation. The two lost softball fields will be replaced through the modification and upgrade of Hilltopper Baseball Field and the construction of a new ball field to the north of that field. Modifications and upgrades to the Hilltopper Baseball Field will include the installation of irrigation and new fencing. The new locations for the fields will make the fields more accessible to installation population. Consequently, this conversion will have a beneficial impact on the availability of these recreation facilities. Construction of the new barracks north of Lincoln Hall will also place the students that will be using the classrooms in Hoge and Lincoln halls, and the new facility located north of Lincoln Hall within a short walk of their billets, thereby resulting in reduced long-term transportation costs and time delays.

#### 5.2.2.2.2 Issue: *Establishment of a New Buffer Area Surrounding the CDTF.*

Implementation of TG 6.3 NBC Decontamination, Advance Proficiency Test (Toxic Agent) will include the introduction of indoor toxic agent chemical training to FLW.

In all three training method implementation alternatives (RCP, OPTM (Army's Proposed Action) and EPTM Alternatives) this training will require the establishment of a unique training facility in which personnel may be trained in a controlled toxic agent environment. This training facility is commonly referred to as the Chemical Defense Training Facility (CDTF). This unique facility is discussed in detail in Volume III, Appendix C, subsection C.3.2.3.

- **Direct Impacts.** As part of the security and safety precautions associated with the CDTF, the Army will establish a new 985-foot (300-meter) radius restricted access security buffer area around the training facility (this area will be clearly marked with signs). Activities within this area would be limited to training directly related to the CDTF and through traffic on the nearby installation roadways. In the unlikely event of an accident in the CDTF, only operational activities directly associated with decontamination and cleanup at the CDTF will be permitted within the zone. Under the guidelines used for determining land use types this safety area would be available for other CDTF related training activities, except for during an accident, and would therefore remain classified as a Training Area land use.

  The design of the CDTF includes: eight negative air pressure training bays; entry vestibules; visual monitoring systems and air monitoring systems; air monitoring systems on the mechanical and filter systems which monitor air exhaust streams to ensure that any agent present does not exceed standards for the protection of human health and safety; and automatic backup power systems which will provide electrical power during power outages. The facility has also been designed to capture any water used for firefighting to prevent inadvertent contamination of the surrounding area. Together these systems provide sufficient redundancy to ensure that toxic agent will not escape the facility in the unlikely event of an accidental spill, power loss, or fire (estimated 1 percent lethality distance of 0 feet) (FMC, 1995e).

  Additionally, as discussed in subsection 5.2.2.15.B, based upon the type, amount and dispersion characteristics of the toxic agents being used, the amount of material used in each training bay is controlled so that the Immediate Danger to Life and Health - Time Weighted Average (IDLH-TWA) for an unprotected individual will not be exceeded within the training bays. Consequently, even if all other safety precautions failed or the structural integrity of the building were destroyed, concentrations of vapor would not exceed the IDLH-TWA.

  During the unlikely event of a release of toxic agent the 985-foot (300-meter) (radius) security area would be used for decontamination and cleanup activities. In approximately 10 years of operation at FMC, the CDTF has not had a release of toxic agent so it is very unlikely that this 985-foot (300-meter) security buffer area would ever be restricted to prevent the flow of traffic on nearby installation range roadways during cleanup activities.

- **Indirect Impacts.** In the event of an accident involving toxic agent training, the 985-foot (300-meter) (radius) restricted security access area would be restricted to persons and vehicles involved in the containment, decontamination and cleanup of the spill. This could affect activities at surrounding training areas and transportation systems. The location of the facility (under the Army's Proposed LU & FP) has been selected so that when the 985-foot (300-meter) area is restricted, it will not impact other occupied facilities or paved installation roadways. The proposed construction site under this land use plan does have several "all weather" range roads that traverse through the restricted area. Travel on these roads is already limited to traffic authorized and controlled by Range Control, but during an accident at the CDTF, travel would be limited to vehicles and persons directly involved in cleanup activities. As stated earlier the likelihood of an accident that would require limiting access in the restricted area is very small. The extent of the impact, should there be an accident, would be short-term and very minor.

### 5.2.2.3 Air Quality and Climate

There are two independent legal requirements which are used to determine air quality impacts. The first governing requirement is the National Environmental Policy Act (NEPA) and the second is the General Conformity Provision per the CAA, Section 176. Fulfillment of one requirement does not fulfill the other requirement, nor does the exemption of one automatically exempt the other. NEPA requires consideration of the direct and indirect effects of an action on the environment through a prescribed documented process. Completion of this EIS fulfills the NEPA air quality analysis requirements.

Federal Regulations (40 CFR, Part 51, Subpart W) establish General Conformity requirements for Federal facilities to ensure that activities do not adversely affect the State Implementation Plan goals. Conformity is aimed at preventing a Federal action from contributing or causing a violation of the National Ambient Air Quality Standards (NAAQS), from increasing the frequency of an existing violation, or delaying the timely attainment standard. The National Highway System Designation Act of 1995, Section 305 (Public Law 104-59) modified the CAA, Section 176 preventing the applicability of General Conformity to attainment areas. **Since FLW is located in an attainment area for all criteria pollutants, the General Conformity Rule does not apply.** Table 4.3 provides a summary of the status of FLW in attainment of the required standards. The Prevention of Significant Deterioration (PSD) is the Clean Air Act regulation that has the greatest air quality impact on the BRAC action. Additional discussion of the regulatory analysis and air quality permitting can be found in subsection 5.2.2.10. The cumulative impacts (including cumulative dispersion modeling) of the BRAC training objectives are discussed in subsection 5.5.

Implementation of the planned BRAC training goals at FLW will result in the following issues with respect to Air Quality and Climate:

- Air Emissions From Flame Field Expedient (FFE) Deterrent Training;
- Air Emissions From The Firing Of Ammunition;
- Air Emissions From BIDS Training;
- Air Emissions From NBC Training;
- Air Emissions From New Simulants for NBC Training;
- Air Emissions From The CDTF;
- Air Emissions From Fog Oil;
- Mobile Source (Vehicle) Air Emissions From Vehicle Operations;
- Mobile Source (Vehicle) Air Emissions From Evasive Driving;
- Emission Of Odors From Fog Oil; and
- Air Emissions From Miscellaneous Class Support Materials.

It should be noted that the emission estimates presented in this air quality analysis represent the anticipated increase in emissions (i.e., in addition to or beyond the baseline emissions described in Section 4.3). Additional information regarding the air emission calculations, methodologies (including emission factors), assumptions and modeling results used throughout the air quality analysis conducted for the FEIS can be found in the Air Quality Technical Reference Document (COE KC, 1997a).

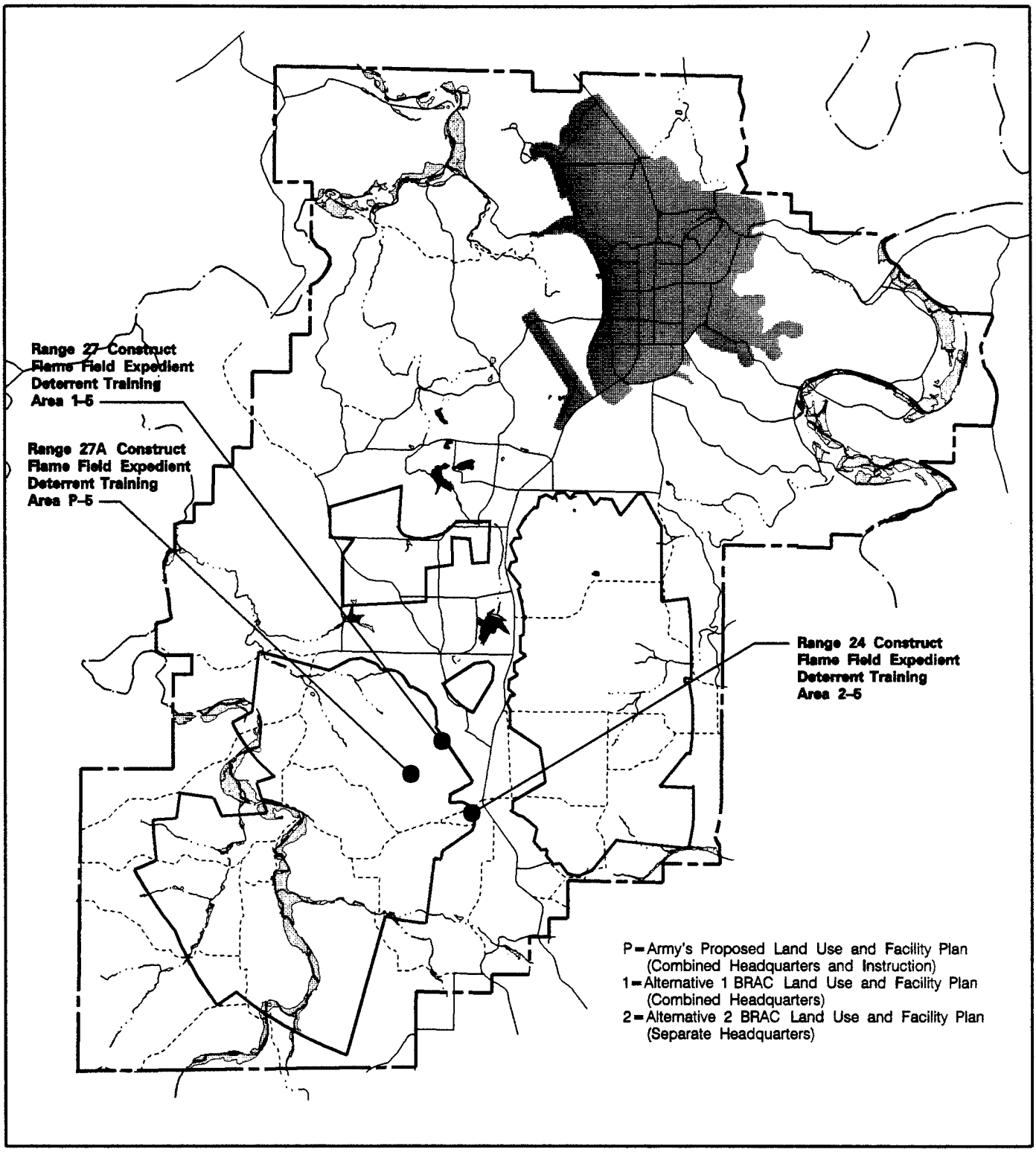
Information supporting the cumulative analysis and results described in subsection 5.5 can also be found in the Air Quality Technical Reference Document. The document is located in the repositories.

**5.2.2.3.1 Issue: *Air Emissions From Flame Field Expedient (FFE) Deterrent Training.*** Included as a key portion of TG 1.3 Mines and Obstacles Training is the use of FFE deterrents that are constructed and detonated as part of the training. This training activity is described in Section 3 and Volume IV, Table IV.2. This aspect of training has the potential for impacting air quality due to FFE deterrent detonation (gasoline fuel ignition). Other aspects of this training, include training on the use, assembly, placement, location, neutralization, camouflage, explosion and demolition of both FFE deterrents and pre-manufactured (issue) mines; and the use, placement, location, neutralization, and camouflage of other obstacles designed to hinder movement. This training is key to several of the skills that must be possessed by Engineer, Chemical and Military Police specialists in a wartime environment. Fort Leonard Wood currently performs training on the use, construction and placement of FFE deterrents as part of Engineer training. Current training is accomplished at Range 33 and involves the use of less than 1,000 gallons (3,800 liters) of fuel per year. Figure 5.2 provides an illustration of alternative FFE deterrent training areas that were considered as a part of this analysis.

**5.2.2.3.1.1 RCP Alternative.** The RCP Alternative will increase current use by approximately 900 gallons (3,420 liters) of "thickened" fuel in each of 41 training cycles per year for a total of 36,900 gallons (140,220 liters) per year. The fuel is combusted in various quantities depending on the type of training being performed.

- **Direct Impacts.** Emissions from this source would be those typical of fossil fuel combustion sources (e.g. nitrogen oxides, carbon monoxide, particulate, and hydrocarbons). It is estimated that approximately 70 gallons (266 liters) of unburned fuel would remain from each of the training cycles, or a total of 2,870 gallons (10,906 liters) per year. Thus approximately 34,030 gallons (129,314 liters) of fuel are combusted. It is conservatively estimated that 100 percent of the unburned fuel will evaporate into the air and is reflected in the air emission calculations. The gasoline evaporation is 100% VOCs. It is also conservatively assumed that some fuel remains in the soil as discussed in subsection 5.2.2.6. Based upon the amount of fuel being combusted as part of this training activity, it has been calculated that the emissions are below the State of Missouri air permitting de minimis levels which are defined as emission levels less than or equal to the rates listed in 10 CSR 10-6.020. Table 5.2 provides a summary of the estimated Air Emissions From Flame Field Expedient Deterrent training. See subsection 5.2.2.10.1 for further discussion of air permitting. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

- **Indirect Impacts.** Although this source emits nitrogen oxides and hydrocarbons below State of Missouri air permitting de minimis levels, indirect effects include contributing to the formation of ground level ozone. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.




LEGEND:

- Cantonment Area
- Installation Boundary
- All Weather Road
- Seasonal Road
- Creek /River
- Intermittent Stream
- Range Boundary
- Wetland Area

N

0 10000 20000

Scale in Feet

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ALTERNATIVE FLAME FIELD EXPEDIENT DETERRENT TRAINING SITES**

**DATE: MARCH, 1997** | **FIGURE NO. 5.2**

**Table 5.2:**
**Estimated Air Emissions From Flame Field Expedient Deterrents Training**

| Pollutants | Emission Factor (lbs emitted/1000 lbs fuel burned)[1] | RCP Alternative Total Emissions[3] (tons/yr) | OPTM (Army's Proposed Action) and EPTM Alternatives Total Emissions[3] (tons/yr) | Air Permitting De Minimis Levels (tons/yr)[2] |
|---|---|---|---|---|
| **Criteria Pollutants** | | | | |
| Nitrogen Oxides (NOx) | 3 | 0.31 | 0.19 | 40 |
| Sulfur Oxides (SOx) | - | 0.00 | 0.00 | 40 |
| Particulate Matter (PM-10) | 98 | 10.23 | 6.25 | 15 |
| Volatile Organic Compounds (VOCs) | 38 | (combustion) 3.97<br>(evaporation) 8.74 | (combustion) 2.43<br>(evaporation) 5.62 | 40 |
| Carbon Monoxide (CO) | 204 | 21.31 | 13.01 | 100 |

Notes: 1 Emissions Factors Taken From "Air Pollutant Emissions From JP-4 Fires Used For Fire Fighting", USAF Environmental Health Laboratory, Major Suggs, November, 1971.
2 Air Permitting De Minimis Emissions Levels Taken From Missouri 10 CSR 10-6.020
3 Total Emissions from Fuel and Thickening Compound Combustion

*Source: Harland Bartholomew & Associates, Inc.*

**5.2.2.3.1.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM Alternatives increase existing use by approximately 550 gallons (2,090 liters) of "thickened" fuel in each of 41 training cycles per year for a total of 22,550 gallons (85,690 liters) per year. The fuel is combusted in various quantities depending on the type of training being performed. Emissions from this source would be those typical of fossil fuel combustion sources (e.g. NOx, CO, Particulate, and Hydrocarbons).

- **Direct Impacts.** It is estimated that approximately 45 gallons (171 liters) of unburned fuel would remain from each of the training cycles, or a total of 1,845 gallons (7,011 liters) per year. Thus approximately 20,705 gallons (78,679 liters) of fuel are combusted. The emissions would be proportionally (by volume) less than those described in the RCP Alternative (see subsection 5.2.2.3.1.1). It is conservatively estimated that 100 percent of the unburned fuel will evaporate into the air and is reflected in the air emission calculations. The gasoline evaporation is 100% VOCs. It is also conservatively assumed that some fuel remains in the soil as discussed in subsection 5.2.2.6. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

- **Indirect Impacts.** Because this source emits NOx and hydrocarbons, indirect effects include contributing to the formation of ground level ozone. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.2 Issue: *Air Emissions From The Firing Of Ammunition.*** This section addresses the impact from the increased air emissions from the detonation of live ammunition and various types of grenades, smoke grenades, and smoke pots from multiple training missions (TG 1.5 Night-Time Squad Engagement, TG 10.1 Weapons Training and TG 10.2 Weapons Training, Pistol). These training activities are described in Volume IV, Table IV.2 and Section 3, and are above what is currently conducted at FLW.

**5.2.2.3.2.1 RCP and OPTM (Army's Proposed Action) Alternative.** This training includes instruction in individual and crew-served weapons (weapons which require more than one person to operate) familiarization and proficiency, and on proper methods for conducting tactical offensive and defensive

military operations. Live-fire ranges will be utilized for this training. There are a variety of ammunition rounds and the amount of gun powder contained in each round varies with each type. In addition, various types of grenades, smoke grenades, and smoke pots will be used.

- **Direct Impacts.** Carbon monoxide and particulate emissions were calculated for smoke pots and smoke grenades as illustrated on Table 5.3. The portions of the smoke grenade and smoke pot which results in air emissions are the pyrotechnic portion and dye/smoke portion. The pyrotechnic portion is ignited or burned, therefore it has been conservatively estimated that combustion emissions are 100% carbon monoxide. The dye/smoke portion has been conservatively estimated that emissions are 100% particulate. Emissions from live ammunition and other explosives were not calculated because a methodology does not exist to estimate air emissions from these types of sources. MDNR does not require these types of sources in FLW's annual Emissions Inventory Questionnaire (EIQ), nor are they included in any of FLW's current air permits. Fort Leonard Wood plans to pursue with MDNR the use of smoke pots in conjunction with fog oil training. Smoke grenades will not be used in conjunction with fog oil training. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

**5.2.2.3.2.2 EPTM Alternative.** This alternative is identical to the training method specified in subsection 5.2.2.3.2.1 (above) except the Mark 19 training will use modified training rounds. These rounds are specifically designed to reduce the potential and extent of ricochet, and do not contain high-explosives.

- **Direct Impacts.** Air emissions associated with weapons training for all munitions except the those used for Mark 19 training would be identical to the emissions anticipated under the RCP and OPTM (Army's Proposed Action) Alternatives. Training with the modified training rounds in lieu of the high-explosive Mark 19 rounds would not result in significantly different total emissions relative to the RCP and OPTM (Army's Proposed Action) Alternatives. Fort Leonard Wood is required to perform PM-10 air monitoring as described in the Monitoring Plan Summary provided in Appendix K. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

**Table 5.3**
**Estimated Emissions from the Firing of Ammunition**

| | CO Emissions (tons/yr) | Particulate Emissions (tons/yr) |
|---|---|---|
| Smoke Pots | 0.17 | 4.53 |
| Smoke Grenades | 0.07 | 1.28 |
| Total Emissions | 0.24 | 5.81 |

*Source: Harland Bartholomew & Associates, Inc.*

**5.2.2.3.3 Issue: *Air Emissions From BIDS Training.*** Instruction in TG 2.1 BIDS Battlefield Employment and Operation is designed to teach students how to identify the potential presence of biological agents on the battlefield. Two biological simulants are released to the environment during this training. These materials are non-toxic as discussed in subsection 3.3.3.2.1. In addition, mobile sources are used for the training. This training activity is described in Section 3 and Volume IV, Table IV.2. The three alternative training methods (RCP, OPTM (Army's Proposed Action) and EPTM Alternatives) for this aspect of BIDS training are identical in the proposed method of instruction. The training will include the use of BIDS equipment (two HMMWVs and one equipment trailer with a 15 KW diesel generator). It is estimated that the generator will be operated approximately 200 hours per year.

- **Direct Impacts.** The air emissions from the mobile 15 KW generator and the vehicle are criteria pollutants. Based on the quantity of hours and size of this generator, PM-10 emissions are less than ten pounds per year, thus are negligible. The largest emission from the generator is NOx

(approximately 125 pounds per year), still a small quantity. In addition, two biological simulants (particulate) are released to the air. Table 5.4 includes the fugitive emissions from the BIDS (excluding mobile exhaust emissions). BIDS training primarily occurs on paved roads therefore no unpaved road emissions are included. When the training does occur off road, the vehicles stop frequently and the system is stationary when actual training is conducted, thus unpaved road emissions during training will be negligible. The emissions are below the State of Missouri air permitting de minimis levels (see Table 5.2). Mobile sources do not require any permitting, thus air emissions were not quantified. See subsection 5.4.2.3.2 for further discussion of mobile sources, subsection 5.2.2.10.1 for discussion of air permitting and Volume III, Appendix B for additional information on simulant use and safety information. Fort Leonard Wood is required to perform PM-10 air ambient monitoring as described in the Monitoring Plan Summary provided in Appendix K. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

**Table 5.4:**
**Estimated Emissions from Biological Integrated Detection System (BIDS) Training**

| Chemical Type | Quantity Used Per Year | VOC Emissions (lbs/yr) | PM-10 Emissions (lbs/yr) |
|---|---|---|---|
| Microcare Solvent | 4.5 gallons (17.1 liters) | 38.7 | 0 |
| BG [1] | 6.1 oz (180 mL), 49.5 lbs | 0 | 49.5 |
| MS2 [1] | 6.1 oz (180 mL) | 0 | negligible |
| *Erwinia herbicola* [1] | 6.1 oz (180 mL) | 0 | negligible |
| Ovalbumin [1] | 6.1 oz (180 mL) | 0 | negligible |
| Kaolin Dust | 24.2 pounds | 0 | 24.2 |
| | Total Emissions (lbs/yr) = | 38.7 | 73.7 |
| | Total Emissions (ton/yr) = | 0.02 | 0.04 |

Note: 1 Materials are mixed with water, not a solvent.

*Source: Harland Bartholomew & Associates, Inc.*

- **Indirect Impacts.** Because this source emits both NOx and hydrocarbons, indirect effects include contributing to the formation of ground level ozone. Fort Leonard Wood is required to perform ozone air ambient monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.4 Issue: *Air Emissions From NBC Training.*** Training in TG 3.1 FOX Battlefield Employment And Operation involves the instruction and operation of chemical detection systems using simulated chemical agents. Most agents contain VOCs which are released to the air. This training activity is described in Section 3 and Volume IV, Table IV.2. The three alternative training methods (RCP, OPTM (Army's Proposed Action) and EPTM Alternatives) for this aspect of FOX training area identical in the proposed method of instruction. Instruction includes the use, employment, and operation of the FOX vehicle and chemical detection system, using simulated chemical agents. The FOX vehicle is a self-contained vehicle capable of operation on both land and in an amphibious environment.

- **Direct Impacts.** Approximately 7.9 gallons (30 liters) of simulants are used annually in this field training. There are a variety of simulants and the amount of VOCs contained in each varies by type. Table 5.5 includes the fugitive emissions from the FOX training. The emissions (excluding mobile exhaust emissions) are below the State of Missouri air permitting de minimis levels (see Table 5.2). See subsection 5.4.2.3.2 for further discussion of mobile source emissions, subsection 5.2.2.10.1 for discussion of air permitting, and Volume III, Appendix B for additional information on simulant use and safety information. The emissions as a result of driving on unpaved roads for FOX driver training and field training exercise (FTX) have been estimated (see Table 5.5). Fort Leonard Wood is required to perform PM-10 air ambient monitoring as described

in the Monitoring Plan Summary provided in Appendix K. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

- **Indirect Impacts.** Because this source emits VOCs, indirect effects include contributing to the formation of ground level ozone. Fort Leonard Wood is required to perform ozone air ambient monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**Table 5.5:**
**Estimated Emissions from Nuclear, Biological and Chemical (NBC) Training**

| Chemical Type | Quantity Used Per Year | VOC Emissions (lbs/yr) | PM-10 Emissions (lbs/yr) |
|---|---|---|---|
| Acetone | 2.0 gallons (7.6 Liters) | 17.30 | 0.00 |
| Anisole | 2.4 oz (72 mL) | 0.20 | 0.00 |
| Benzaldehyde | 1 oz (30 mL) | 0.10 | 0.00 |
| Cyclohexanone | 1 oz (30 mL) | 0.10 | 0.00 |
| Diethyl Malonate | 5 gallons (19.03 L) | 43.20 | 0.00 |
| Diethyl Phthalate | 0.3 gallons (1.2 L) | 2.70 | 0.00 |
| Dimethyl Phthalate | 2 oz (60 mL) | 0.10 | 0.00 |
| Ethyl Phthalate | 1 oz (30 mL) | 0.10 | 0.00 |
| Eucalyptol | 1.6 gallons (6.0 L) | 13.60 | 0.00 |
| Isopropyl Alcohol | 36 ounces | 2.40 | 0.00 |
| Methyl Salicylate | 4 gallons (15.03 L) | 34.20 | 0.00 |
| PEG-200 | 143 gallons (540 Liters) | 1,383.00 | 0.00 |
| | Total Emissions (lbs/yr) = | 1,497.00 | 0.00 |
| | Total Emissions (ton/yr) = | 0.75 | 0.00 |
| Unpaved Road Emissions During Training(ton/yr) = | | - | 1.60 |

*Source: Harland Bartholomew & Associates, Inc.*

**5.2.2.3.5 Issue: *Air Emissions From New Simulants for NBC Training.*** Training in TG 6.1 Nuclear, Biological and Chemical Procedures involves the use of miscellaneous chemicals which are released to the air. This training activity is described in Section 3 and Volume IV, Table IV.2.

**5.2.2.3.5.1 RCP Alternative.** The RCP Alternative includes instruction with various materials designed to simulate chemical agents and instruction with sealed and unsealed radiological isotopes in interior training environments. Although it has never been accomplished at FMC, the RCP Alternative includes the ability to train with unsealed radiological isotopes in exterior training environments (see subsection 5.2.2.15.B.7).

- **Direct Impacts.** Chemical agent simulants will be used (similar to the FOX training). The primary air emissions are VOCs. Table 5.6 includes the fugitive emissions from NBC training that will be initiated at FLW in FY99. The emissions are below the State of Missouri air permitting de minimis levels (see Table 5.2). See subsection 5.2.2.10.1 for discussion of air permitting, and Volume III, Appendix B for additional information on simulant use and safety information. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

- **Indirect Impacts.** Because this source emits VOCs, indirect effects include contributing to the formation of ground level ozone. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.5.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM Alternatives include instruction with materials designed to simulate chemical agents, but limits training with open (unsealed) radiological isotopes to interior training areas; although sealed radiological isotopes may be used in either interior or exterior training environments. It is anticipated that this modification in the training method will not change the air emissions compared to the RCP Alternative.

**Table 5.6:**
**Estimated Emissions from New Simulants for Nuclear, Biological and Chemical (NBC) Training**

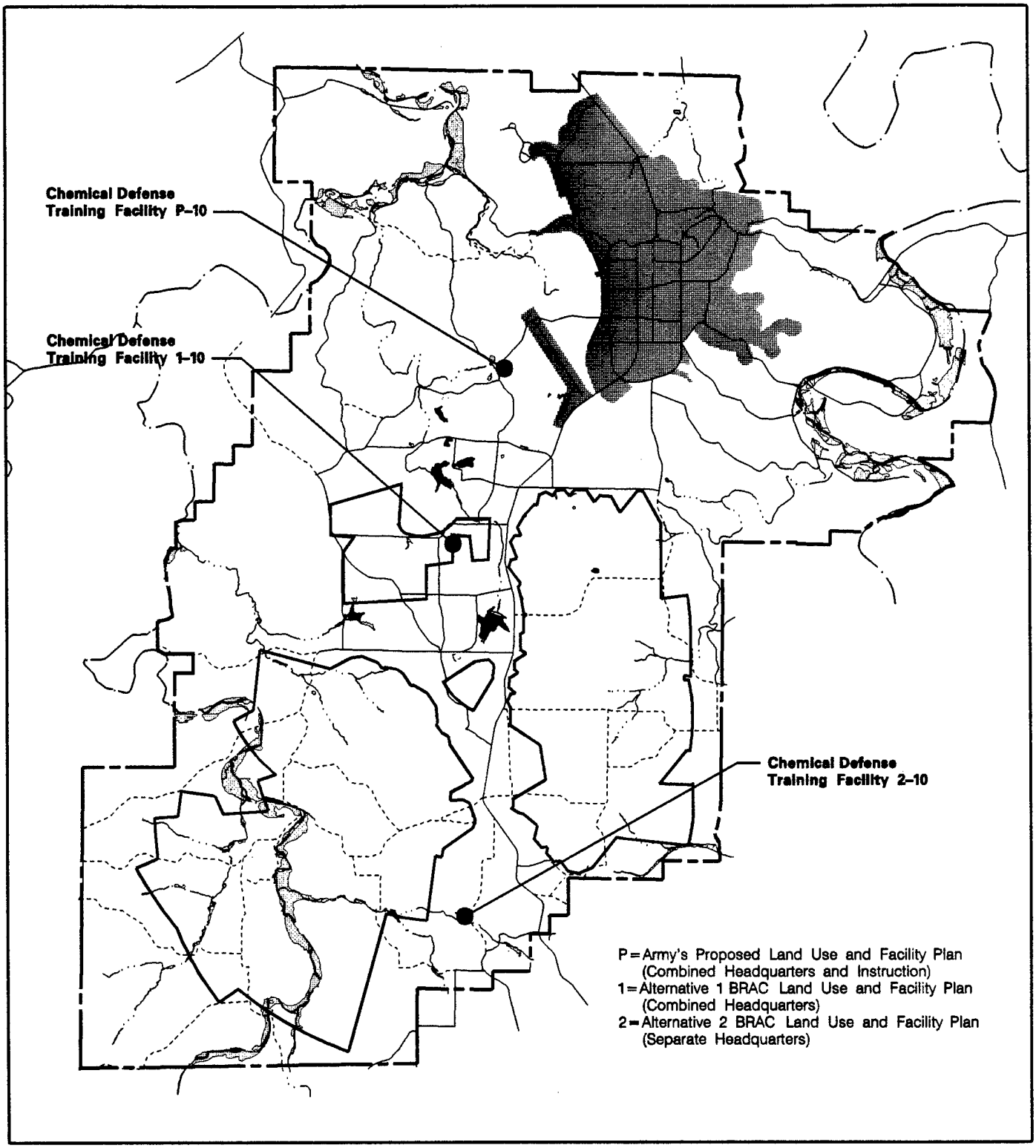
| Chemical Type | Quantity Used Per Year | VOC Emissions (lbs/yr) | PM-10 Emissions (lbs/yr) |
|---|---|---|---|
| **Future Chemical Simulant Implemented in FY98** | | | |
| GD Simulant (PCAS) | 475 gallons (1,800 L) | 1,063.40 | 0.00 |
| HL Simulant (PCAS) | 475 gallons (1,800 L) | 1,022.50 | 0.00 |
| CADS | 225 gallons | 1,373.90 | 0.00 |
| | Total Emissions (lbs/yr) = | 3,459.80 | 0.00 |
| | Total Emissions (ton/yr) = | 1.73 | 0.00 |

*Source: Harland Bartholomew & Associates, Inc.*

**5.2.2.3.6 Issue: *Air Emissions From The CDTF.*** Implementation of TG 6.3 NBC, Decontamination, Advanced Proficiency Test will require the construction of a CDTF (as discussed in subsection 5.2.2.2.1) to instruct personnel on chemical agent location, identification and decontamination. This training activity is described in Volume IV, Table IV.2. Figure 5.3 provides an illustration of the alternative locations considered for the CDTF. See Section 5.2.2.8.5 for further description on the management of toxic agents and section 5.2.2.15.B for discussion of human health and safety. The Army is not proposing the use of a thermal treatment unit on-site for the disposal of decontaminated waste by-products from the CDTF as part of the OPTM.

The toxic agents which would be used in the training are GB (sarin) and VX. Each are formed by the mixing of two separate compounds to produce the toxic agents. The binary agents are stored in a locked safe, located in a guarded, double locked area. GB is a highly volatile substance with a high solubility in water. The GB airborne exposure limit is 0.0001 $mg/m^3$ based on an 8-hour time weight average (TWA). VX on the other hand has an extremely low volatility and is thus primarily a contact hazard. The VX airborne exposure limit is 0.00001 $mg/m^3$ based on an 8 hour TWA.

For protection of Army and civilian personnel inside the CDTF, the facility which would contain the toxic agent training is physically divided into two sections. The first area is the "cold" area in which no agents would be used or stored. The "hot" area is the portion of the building which contains the area where the toxic agents are mixed, stored, used in training and decontaminated. The "hot" training area will include eight functionally separate training areas, with each area kept under negative pressure and vented through filter trains made up of prefilters, activated carbon adsorption systems and high efficiency particulate air (HEPA) filters. For safety, all "hot" areas are assumed to have air contaminated with nerve agents and chemical decontaminants. The "hot" area ventilating system is designed to maintain a negative pressure in the "hot" areas with respect to the "cold" areas of the building. The pressure in the "hot" areas varies with expected contamination levels, being least negative in areas adjacent to the "cold" areas, and becoming increasingly negative from front to rear of the "hot" area to force any air infiltration to flow from "cold" areas into the "hot" areas. The air in each zone is exhausted through two sets of HEPA and activated carbon filters for redundancy in each filter train. Each of the filter trains is independent and has a cross-sectional area sized for its design air flow (MDNR Permit # 0495-013). The building is also equipped with redundant air chemical monitoring systems that continuously document nerve agent concentrations in the training bays and trigger alarms if levels are detected above predetermined set points. The CDTF will be equipped with air monitoring systems to monitor for toxic agents in the air




LEGEND:

- Cantonment Area
- Installation Boundary
- All Weather Road
- Seasonal Road
- Creek /River
- Intermittent Stream
- Range Boundary
- Wetland Area

N

0 10000 20000

Scale in Feet

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ALTERNATIVE TOXIC AGENT TRAINING SITES**

**DATE: MARCH, 1997** | **FIGURE NO. 5.3**

T:\LWOOD\BRACEIS\ATTRAIN.DGN

exhaust streams from the HEPA/carbon filter system. Further discussion of the CDTF facility is provided in subsection 3.3.3.6.3.

**5.2.2.3.6.1 RCP Alternative.** Under the RCP Alternative, the CDTF would include the construction and operation of a thermal treatment unit which would be used for treatment/destruction of decontaminated waste by-products of toxic agent training including both liquid and solid wastes. No wastes from other sites would be transferred to the CDTF for treatment/disposal. The thermal treatment unit would have redundant control systems. No chemical agents are allowed to be emitted from the thermal treatment unit stack. The impact to the air is associated with the emissions from the thermal treatment unit. Note that although the RCP Alternative is reasonable, the OPTM (Army's Proposed Action) and EPTM Alternative, as discussed in subsection 5.2.2.3.6.2 below, will not require the construction or use of a thermal treatment unit.

The CDTF will be used to instruct personnel on chemical agent location, identification and decontamination. Solid and liquid wastes generated as byproducts of toxic agent training are decontaminated inside the training area and would then be further treated in the thermal treatment unit. The MDNR permit to construct specifically states that the thermal treatment unit may NOT be charged with hazardous waste. The thermal treatment unit would be operationally very different than those used to destroy chemical weapons. This thermal treatment unit would destroy much smaller quantities of materials and the materials would consist of previously decontaminated waste by-products of toxic agents.

As the key element of each training session, a comprehensive decontamination procedure is performed on all training bays and the associated training materials. The training materials include items such as boots, gloves, hoods, overgarments, carbon filters, gas mask filters and trash. Gas masks which contain chromium (used by foreign allied training personnel only) are separated and disposed of as a hazardous waste. Several different types of chemicals, including super tropical bleach (STB), decontaminating solution number 2 (DS2), sodium hypochlorite and sodium hydroxide, are used to decontaminate toxic agent which may have potentially contaminated these items. All wash down water is collected and then treated to decontaminate residual toxic agent. The wash down water is then analyzed in the CDTF laboratory to ensure that the levels of decontaminated toxic agent are below established standards. If the analytical results are not acceptable, the wash down water is further decontaminated. Once the test results are acceptable, the wash down water is pH adjusted. All decontaminated materials and waste water are subsequently thermally treated under the RCP Alternative.

After a training mission, Battle Dress Overgarments (BDOs) and other solid materials are decontaminated, and then monitored for offgassing for 24 hours. If they meet a specified standard (0.0001 $mg/m^3$ for GB and 0.00001 $mg/m^3$ for VX), then they are monitored for an additional 24 hours prior to autoclave treatment (see AR-385-61). If they fail this standard, they are decontaminated again and monitored for an additional 24 hours. If required, this process is repeated until the BDOs and other solid materials meet the standard.

A dry steam autoclave is used for the hygienic treatment of the decontaminated BDOs. The dry steam autoclave hygienically treats the BDOs at 250°F and 15 pounds per square inch pressure for 30 minutes, thereby allowing the BDOs to be used by different personal up to four times before they are then disposed through the thermal treatment unit. BDOs that have known chemical agent contamination are chemically decontaminated, monitored, and sent directly to the thermal treatment unit. A dry steam autoclave is heated via steam in both an outside jacket, and within the chamber of the autoclave. The vented steam from inside the autoclave chamber is captured and sent to the thermal treatment unit. Steam from the outside jacket is recycled.

The air in each zone of the CDTF is exhausted through two sets of HEPA and activated carbon filters for redundancy in each filter train. Each of the filter trains is independent and has a cross-sectional area sized for its design air flow. The used filter media is then recovered and sent to the thermal treatment unit.

The thermal treatment unit has a solid waste capacity of 125 pounds per hour. The total estimated annual throughput used for air permitting is 250,000 pounds of Type 0 (solid) waste and 6,225,000 pounds of Type 5 (liquid) waste (taken from air permit #0495-013). The actual quantities of waste generated though will be less. See subsection 5.2.2.8.5 for further discussion of the waste quantities. Its design is a forced draft, batch type, dual chamber unit. The primary chamber burner is rated at 2.594 million British Thermal Units Per Hour (MBTU/hr) and the secondary chamber burner is 25.778 MMBTU/hr. The thermal treatment unit has a maximum design heat release rate of 4,610 BTU/pound.

The thermal treatment unit would be equipped with multiple emission controls. The emissions would be directed through a venturi scrubber and a packed tower scrubber connected in series. In accordance with MDNR issued Permit to Construct (# 0495-013), a Proposed Test Plan must be submitted to MDNR for approval. To validate the control technology efficiencies, air quality permit monitoring requirements for the thermal treatment unit include a stack test within 90 days of reaching full operation, but not more than 180 days after initial startup. All performance tests shall be conducted, and data reduced, in accordance with specified USEPA Test Methods unless an equivalent or alternative test method is otherwise approved by the Director of MDNR. The stack test would determine particulate matter 10 microns or less (PM-10), carbon monoxide, dioxins/furans, hydrogen chloride, mercury, GB and VX concentrations. There would be no inference as to other materials present or not present based on these measurements. The permit specifies the allowable emission limits for each of these constituents and no detectable quantity of either GB or VX is allowed.

The CDTF would include a waste heat boiler which is the source of heat for the thermal treatment unit. This boiler would also provide heat to the CDTF when the thermal treatment unit is in operation. When the thermal treatment unit is not in operation, a standby package boiler would be used to heat the CDTF. A heat recovery system is used with the thermal treatment unit to generate steam for the autoclave. A 600 kilowatt generator is located at the facility for electrical backup.

- **Direct Impacts.** The CDTF incinerator would have emissions of both criteria and hazardous air pollutant emissions. The emission calculations are based on the potential to emit, not the predicted actual emissions. For a conservative emission estimate, No. 2 Fuel Oil was used for calculations instead of the cleaner burning natural gas which is the intended fuel. See Table 5.7 for estimated air emissions. A Construction Permit was required and obtained for the RCP Alternative because the CDTF includes a thermal treatment unit. Ambient air quality modeling was performed by MDNR during the permit process.

  Footnotes used in Table 5.7 appear at the end of the table.

**Table 5.7:**
**Estimated Air Emissions from the Chemical Defense Training Facility (All Training Alternatives)**

| Pollutant | RCP Alternative Annual Emissions (tons/yr) [1] | OPTM (Army's Proposed Action) and EPTM Alternative Emissions (tons/yr) |
|---|---|---|
| **600 KW Standby Generator** | | |
| PM-10 | 0.4 | 0.4 |
| Sulfur Dioxide | 4.3 | 4.3 |
| Nitrogen Dioxides | 26.2 | 26.2 |
| Carbon Monoxide | 6.9 | 6.9 |
| VOCS | 0.9 | 0.9 |
| **Standby Package Boiler** | | |
| PM-10 | 0.4 | 0.4 |
| Sulfur Dioxide | 1.4 | 1.4 |
| Nitrogen Dioxides | 3.9 | 3.9 |
| Carbon Monoxide | 1 | 1 |

**Table 5.7:**
**Estimated Air Emissions from the Chemical Defense Training Facility (All Training Alternatives)**

| Pollutant | RCP Alternative Annual Emissions (tons/yr) [1] | OPTM (Army's Proposed Action) and EPTM Alternative Emissions (tons/yr) |
|---|---|---|
| VOCS | 0.1 | 0.1 |
| **Thermal Treatment Waste Heat Boiler** | | |
| PM-10 | 0.2 | 0.2 |
| Sulfur Dioxide | 1.2 | 1.2 |
| Nitrogen Dioxides | 3.4 | 3.4 |
| Carbon Monoxide | 5.4 | 5.4 |
| VOCS | 0.4 | 0.4 |
| **CDTF Thermal Treatment Unit** | | |
| PM-10 | 0.12 | 0 |
| Sulfur Dioxide | 0.09 | 0 |
| Nitrogen Dioxides | 0.21 | 0 |
| Carbon Monoxide | 1.06 | 0 |
| VOCS | 0.08 | 0 |
| Lead | 0.019984 | 0 |
| Hydrochloric Acid | 0.142145 | 0 |
| Total PCB | 0.000002 | 0 |
| Antimony | 0.003504 | 0 |
| Arsenic | 0.000066 | 0 |
| Beryllium | 0.000002 | 0 |
| Cadmium | 0.0015 | 0 |
| Chromium | 0.000212 | 0 |
| Manganese | 0.000155 | 0 |
| Mercury | 0.029291 | 0 |
| Nickel | 0.000162 | 0 |
| Hydrogen Fluoride | 0.006322 | 0 |
| Chlorine | 0.004455 | 0 |
| TCDD | 0.00000027 | 0 |
| HxCDD | 0.0000000005 | 0 |
| HpCDD | 0.0000000014 | 0 |
| OCDD | 0.000000006 | 0 |
| Total CDD | 0.00000583 | 0 |
| TCDF | 0.00000197 | 0 |
| PcCDF | 0.0000000008 | 0 |
| HxCDF | 0.0000000047 | 0 |
| HpCDF | 0.0000000055 | 0 |
| OCDF | 0.0000000203 | 0 |
| Total CDF | 0.00001957 | 0 |

Note: 1 Data taken from Air Permit # 0495-013

*Source: Harland Bartholomew & Associates, Inc.*

See Table 5.8 for modeling results which are taken at the point of highest impact, just under 300 meters (985 feet) downwind of the facility. Additional information regarding the modeling results can be found in the Air Quality Technical Reference Document (COE KC, 1997a). All ambient

impacts are below the applicable impact standard; where the table states "no standard" it simply means that an acceptable ambient standard has not been determined. There are numerous miscellaneous support materials that are used within the CDTF as identified in Volume III, Appendix B, Table B.7. The emissions from these materials are negligible since the CDTF is negatively pressurized and air is vented through a HEPA filter and carbon absorption system. The CDTF is equipped with air monitoring systems to monitor the air exhaust streams from the HEPA/carbon filter system for toxic agents.

**Table 5.8:**
**Ambient Air Quality Impact from the Chemical Defense Training Facility (RCP Alternative Only)**

| Pollutant | Ambient Air Impacts ($\mu g/m^3$) [1] | | Ambient Air Impacts ($\mu g/m^3$) [2] | | Ambient Air Standard ($\mu g/m^3$) [1] | |
|---|---|---|---|---|---|---|
| PM-10 | 0.58 | 24-hour | 0.58 | 24-hour | 150.00 | 24-hour |
| Sulfur Dioxide | 8.82 | 1-hr | 7.94 | 3-hr | 1,300.00 | 3-hr |
| Nitrogen Oxides | 17.36 | 24-hr | 4.34 | annual | 100.00 | annual |
| Carbon Monoxide | 18.13 | 1-hr | 18.13 | 1-hr | 40,000.00 | 1-hr |
| VOCS | 1.88 | 1-hr | 1.88 | 1-hr | 235.00 | 1-hr |
| Lead | 0.01 | 1-hr | 0.004 | quarterly | 1.50 | quarterly |
| **Pollutant** | **Ambient Air Impacts ($\mu g/m^3$)[1]** | | **Ambient Air Impact ($\mu g/m^3$) [2]** | | **MDNR Acceptable Ambient Level ($\mu g/m^3$) [1, 3]** | |
| Antimony | 0.0046 | 1-hr | 0.0032 | 8-hr | 6.67 | 8-hr |
| Arsenic | 0.0001 | 1-hr | 0.00007 | 8-hr | 0.03 | 8-hr |
| Beryllium | 0.000004 | 1-hr | 0.00000028 | 8-hr | 30 | 8-hr |
| Cadmium | 0.002 | 1-hr | 0.0014 | 8-hr | 50 | 8-hr |
| Chromium | 0.0003 | 1-hr | 0.00012 | 24-hr | 1.36 | 24-hr |
| Manganese | 0.0002 | 1-hr | 0.00014 | 8-hr | 0.89 | 8-hr |
| Mercury | 0.0027 | 8-hr | 0.0027 | 8-hr | 0.01 | 8-hr |
| Nickel | 0.0002 | 8-hr | 0.0002 | 8-hr | 1.33 | 8-hr |
| Hydrogen Fluoride | 0.0033 | 24-hr | 0.0033 | 24-hr | 0.68 | 24-hr |
| Chlorine | 0.0024 | 1-hr | 0.00096 | 24-hr | 3.95 | 24-hr |
| TCDD | 0.0000004 | 1-hr | 0.0000004 | 1-hr | no standard | |
| HxCDD | 0.00000001 | 1-hr | 0.00000001 | 1-hr | no standard | |
| HpCDD | 0.00000001 | 1-hr | 0.00000001 | 1-hr | no standard | |
| OCDD | 0.00000001 | 1-hr | 0.00000001 | 1-hr | no standard | |
| Total CDD | 0.000037 | 1-hr | 0.000037 | 1-hr | no standard | |
| TCDF | 0.0000026 | 1-hr | 0.0000026 | 1-hr | no standard | |
| PcCDF | 0.00000001 | 1-hr | 0.00000001 | 1-hr | no standard | |
| HxCDF | 0.00000001 | 1-hr | 0.00000001 | 1-hr | no standard | |
| HpCDF | 0.00000001 | 1-hr | 0.00000001 | 1-hr | no standard | |
| OCDF | 0.00000003 | 1-hr | 0.00000003 | 1-hr | no standard | |
| Total CDF | 0.000026 | 1-hr | 0.0000266 | 1-hr | no standard | |

Note:
1 Data taken from Air Permit # 0495-013
2 Calculated by Harland Bartholomew and Associates, Inc. based on established multiplying factors and data taken from Air Permit #0495-013. The calculations were performed to directly compare the predicted impacts to the ambient air standards and MDNR acceptable ambient levels using the same time standards.
3 Developed by MDNR based on health based standards

*Source: Harland Bartholomew & Associates, Inc.*

- **Indirect Impacts.** Because this source emits NOx and hydrocarbons, it would have an indirect effect of contributing to the formation of ground level ozone.

**5.2.2.3.6.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** Implementation of these alternatives would not change the training methods used in the RCP Alternative for TG 6.3NBC, Decontamination, Advanced Proficiency Test (Toxic Agent). Implementation of these alternatives would, however, alter the methods used for the disposal of the decontaminated by-products (both liquid and solid) that result from toxic agent decontamination training. Under this alternative decontaminated waste by-products from training would be disposed of using an off-site, permitted, commercial vendor. As discussed in subsection 5.2.2.8.5 and Volume III, Appendix I, subsection I.4 this method was selected as the OPTM (Army's Proposed Action) and the EPTM based on a review of environmental and operational considerations.

Implementation of these alternatives will eliminate the need to construct and operate a thermal treatment unit at the FLW CDTF. Initial investigations have shown that there are multiple vendors that are capable of collecting, transporting and disposing of the decontaminated liquid and solid waste byproducts of toxic agent training. Furthermore, these vendors have access to a wide range of approved disposal locations and methods. Selection of the disposal vendor(s), site(s) and method(s) will be based on review of vendor proposals. The Army will consider the following evaluation criteria in reaching their decision:

- the nature of the disposal method;
- the disposal method's potential to limit the risk of future contamination;
- the performance of the specified disposal facility, include environmental management, compliance and monitoring practices; and
- the disposal contractor having appropriate Federal, state and local environmental licenses and permits.

Under the OPTM (Army's Proposed Action) and EPTM Alternatives, the CDTF would still use an autoclave for hygienic treatment of decontaminated BDOs, thereby allowing the BDOs to be worn by different individuals. An autoclave boiler would be required as the source of heat for the autoclave. The autoclave boiler would burn natural gas as would the boiler for supplying heat to the facility. The autoclave gas phase waste would pass through a condenser, through a separator, and into the waste water tanks (condensate) or through the filtration system (remaining gases). Since the thermal treatment unit is not part of this alternative, the liquid waste from the autoclave would be treated similar to the liquid waste from the CDTF, through a commercial off-site vendor. BDOs would still be used up to four times (decontaminated between uses). They would then be disposed of through the off-site commercial vendor. For the BDOs that have known chemical agent contamination, they would be chemically decontaminated, monitored, and then disposed of through the off-site commercial vendor. Decontaminated liquid wastes would be held in liquid waste tanks less than 90 days until shipped to an off-site commercial vendor.

- **Direct Impacts.** The amount of air emissions is reduced from the RCP Alternative because the thermal treatment unit and waste heat boiler have been eliminated (see Table 5.7). The generator and facility boiler would remain as well as the requirement for an autoclave steam boiler. The emissions from the autoclave steam boiler are conservatively assumed to be similar to those of the waste heat boiler. The gas phase from the autoclave would be sent through a condenser, through a separator, and then either to the waste water tanks (condensate) or to the HVAC HEPA/carbon absorption control system (remaining gases). The emissions from the autoclave are anticipated to be insignificant because the autoclave is used for hygienic treatment purposes only. It is not used for destruction of the BDOs. The CDTF will be equipped with air monitoring systems to monitor for toxic agents in the air exhaust streams from the HEPA/carbon filter system. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

  There are numerous miscellaneous support materials that are used within the CDTF as identified in Table B.7 in Appendix B. The emissions from these materials are negligible since the CDTF is negatively pressurized and air is vented through a HEPA filter and carbon absorption system. If

this alternative is implemented, either the existing Construction Permit would be used or a modification to the existing permit would be pursued with MDNR.

- **Indirect Impacts.** The quantity of ozone formation is anticipated to be reduced compared to the RCP Alternative.

**5.2.2.3.7 Issue: *Air Emissions From Fog Oil Training.*** Fort Leonard Wood has applied for and been granted an air permit for fog oil training based on 65,000 gallons (247,000 liters) per year and 3,700 pounds per day usage (approximately 3,700 lbs / day X 1 gal / 7.68 lbs = 481 gallons / day). A copy of the fog oil air permit is provided in Volume III, Appendix J and a summary of the air permit is provided in Table 5.9 (which is located on page 5-38). The permit application required air dispersion modeling which was based on three conservative assumptions that have substantial effects on the following air quality analysis. These assumptions were made based on the best available information at the time. The three assumptions were:

1) Particulate ambient air monitoring data selected by MDNR was used as the representative background data for air dispersion modeling. The closest background monitoring location to the installation with available MDNR background data was selected to be representative of general ambient air conditions in the FLW area.

2) Fog oil emissions in ambient air were assumed to be 70 percent by weight particulate and 30 percent by weight VOC. This assumption was based on a limited set of data developed in past studies by the Army at Dugway Proving Grounds.

3) The air dispersion modeling was performed using ISC3 which assumes all sources operate concurrently, there are no surface or terrain contours, no vegetation, no deposition and the wind blows in a single direction continuously for one hour (i.e. worst case conditions). Air dispersion modeling is used to determine air pollutant fate and transport. The USEPA has developed guidelines identifying the use of specific models for various applications and these guidelines are described in 40 CFR Part 51 Appendix W (Guideline on Air Quality Models (Revised)).

The Army has initiated additional studies and programs to evaluate and possibly refine these modeling assumptions to better depict actual conditions of this training. Any subsequent refinement to these assumptions could alter the air quality analysis and will be documented when FLW requests renewal or modification of their existing air quality permit. Compliance with this permit will ensure that air quality is maintained.

The current permit specifies both daily and annual limits and requires both ozone (a VOC photochemical by-product) and particulate ambient air monitoring. MDNR can make adjustments to the air permit based on the results of the ambient air monitoring. The Proposed Action (OPTM) will not be fully implemented at FLW unless a revised permit is granted for the increased quantities. Subsection 5.5 documents mitigation actions to be applied to the OPTM Alternative to ensure compliance.

There are three distinct training operations which result in fog oil emissions: TG 7.2 Obscurant, Employment Operations Basic (Static); TG 7.3 Obscurant, Employment Proficiency Test (Mobile Operations); and TG 7.4 Obscurant, Employment Proficiency Test (Field Training Exercises). These training goals are summarized in Section 3, and described in more detail in Volume IV, Table IV.2. For purposes of this section, all three TG's will be combined. The difference among the three training method (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives is the quantity of fog oil to be used on a daily and annual basis. At the time the air permit was obtained, these limits were thought to accurately reflect Army training requirements. As part of the EIS analysis, it was determined that the initial fog oil training requirements identified by the Army did not accurately reflect the full extent of fog oil training that would be required, specifically training by Army Reserves.

The Clean Air Act (CAA) established the NAAQS for air pollutants using health-based criteria. These standards are a maximum concentration. Short-term standards are allowed one exceedance at any given receptor point each year. If a region meets the NAAQS for each pollutant, the region is in "attainment" and if the region fails to meet the standards for a pollutant, the region is classified as "non-attainment" for that particular pollutant. The Clean Air Act instituted a permitting mechanism called the Prevention of Significant Deterioration (PSD) for new or modified major stationary air emissions sources in attainment regions. The Missouri Department of Natural Resources (MDNR) has been delegated the authority by EPA for administering PSD air permits within Missouri. The PSD permitting process is intended to prevent new or modified stationary sources from causing a NAAQS violation thereby causing an attainment area to become a nonattainment area. The MDNR found that FLW is a "major source" in an attainment area and therefore invoked the PSD permitting process.

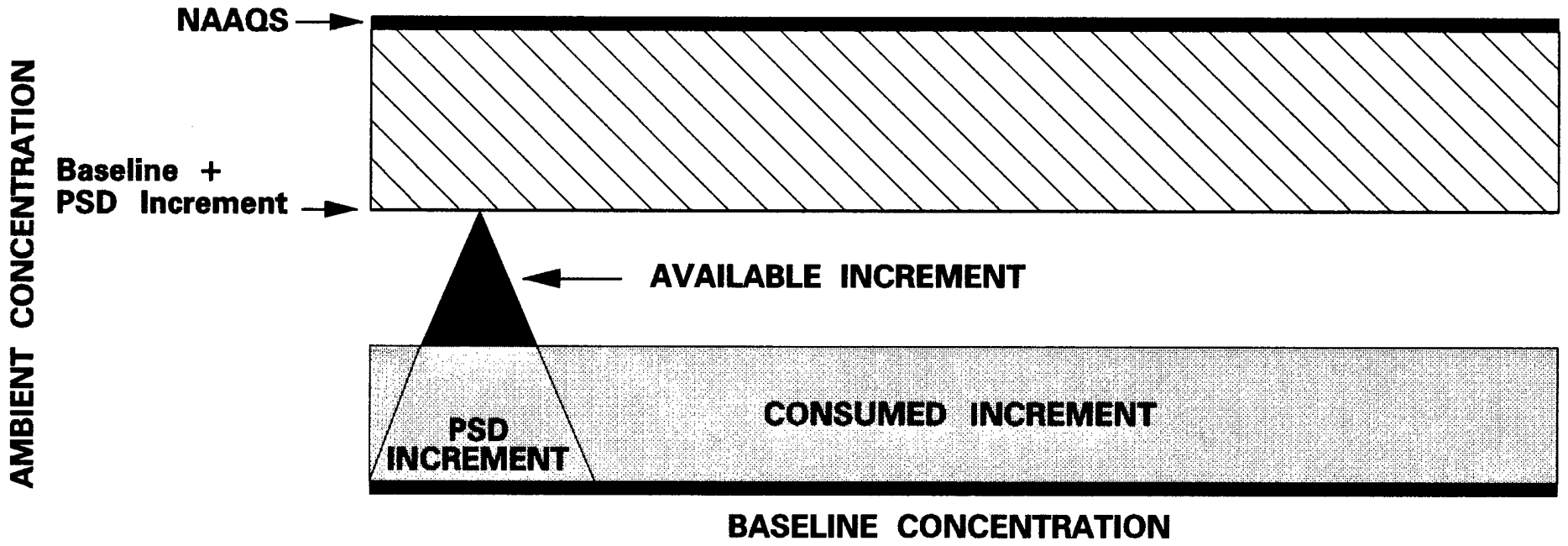
All PSD permit applications must contain a comprehensive air quality analysis to assess ambient air quality impacts. This analysis must demonstrate that the additional air emissions will not directly cause, or contribute, to a potential NAAQS violation. If this comprehensive analysis results in impacts (or quantities) above certain thresholds, ambient air monitoring is required to ensure NAAQS are met. It is compliance with the PSD permit which will ensure NAAQS are met. The PSD regulations are the primary air quality regulations which impact the BRAC Action. Because the PSD permitting process is designed for stationary sources, mobile source exhaust emissions from automobiles and trucks typically are not included.

The Clean Air Act established the PSD increment. A PSD increment represents the maximum concentration increase allowed (by all sources in the impacted area) above the established baseline concentration. The EPA has established increments for particulate matter (as PM-10), sulfur dioxide, and nitrogen dioxide. The purpose of PSD increments is to prevent a "clean" attainment area from becoming a "dirty" nonattainment area by controlling the amount of emissions (through an allowed particulate concentration) that can be added to an area or region. The PSD program allows for different increments depending on the classification of the area. The FLW region is a Class II area, thus the 24 hour PM-10 PSD increment is 30 $\mu$g/m3 and the annual PM-10 PSD increment is 17 $\mu$g/m3.

The consumption of PSD increments is tracked by the Missouri Department of Natural Resources (MDNR). When the first PSD application is submitted in an area, a trigger date is set. The FLW fog oil permit submitted to MDNR was the first PSD permit application in the area, thus the trigger date was established as June 7, 1995 (the approval date of the fog oil permit) and the entire PSD increment is available. When the trigger date is set, all existing source emissions (within the area of the first PSD source) are calculated and evaluated through an air quality model. A baseline concentration is established for the area around the new PSD source. In this area, the air quality can only be deteriorated equal to the amount of PSD increment. The sum of the PSD increment and baseline concentrations can never exceed the NAAQS. Figure 5.4 shows the relationship between the PSD increment and the NAAQS. The NAAQS are presented in subsection 4.3.

The USEPA has provided modeling guidelines (*Guideline on Air Quality Models, USEPA-450/2-78-027)* which a new or modified PSD source should follow to demonstrate compliance with the NAAQS and PSD increments. For the NAAQS demonstration, a PSD permit applicant initially models the new source emission impacts alone. Impacts from the new source are calculated in ambient air. If the impacts in ambient air are predicted to be below predefined PSD significance levels in 40 CFR Part 52.21, then typically no further modeling of NAAQS and PSD increments are required. The significance levels for PM-10 are:

- 5 $\mu g/m^3$ average concentration for 24 hour period; and
- 1 $\mu g/m^3$ average concentration for annual period.




**LEGEND:**

PSD Increment

| | |
|---|---|
| HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI | KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI |
| ENVIRONMENTAL IMPACT STATEMENT | |
| RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI | |
| **RELATIONSHIP BETWEEN THE NAAQS AND PSD INCREMENT** | |
| DATE: MARCH, 1997 | FIGURE NO. 5.4 |

If the predicted impacts are above the significance levels, then the extent of the significant impact area is defined. All stationary sources within the impact area expected to have a significant impact and possibly some major sources within 50 kilometers of the impact area are required to be included in the modeling exercise. To account for fugitive sources and very small point sources (e.g. automobile exhaust, gravel and dirt roads with vehicular traffic, fireplaces, and other intermittent small sources), USEPA recommends that a background concentration be added to the modeled concentrations, then compared to the NAAQS (*New Source Review Workshop Manual (draft)*). The background concentrations are typically obtained from an ambient air monitoring station nearby or representative of the area. Fort Leonard Wood, at MDNR's request, used particulate ambient air monitoring data from Mark Twain Lake as the representative background data. The background concentration was 39 $\mu g/m^3$ for a 24-hour period. For each of the over 1,600 locations around Fort Leonard Wood where modeling impacts were predicted, the background concentration was added to the baseline concentrations.

During the permit application process, a possible exceedance of the NAAQS was predicted from existing sources although most exceedances were predicted 18 miles (30 km) or greater from the installation. Based on further analysis, Fort Leonard Wood's permitted smoke training activities were not predicted to have a significant contribution to these predicted NAAQS exceedances (Burns, 1996). The prescribed methods for making this determination are defined in 40 CFR Part 51.165 (b) and further described in USEPA memorandums dated 16 December, 1980 and July 5, 1988.

There is not a reliable air dispersion model to predict local point source contributions to ozone formation. Ozone formation is a complex, photochemical set of reactions. In lieu of air dispersion modeling, MDNR has required FLW to monitor ozone.

**Opacity.** The purpose of the smoke training is to instruct soldiers in the theory and operation of smoke concealment. After smoke training, the soldiers who have received training will be able to use their skills in a wartime situation. The ability to conceal troops and other sensitive targets will save lives. Missouri air regulations 10 CSR 10-3.080 require facilities in Missouri to limit stack emissions to 20% or less opacity. Opacity at a smoke generator stack is 100%. Fog oil smoke opacity decreases with distance. MDNR recognizes that certain activities such as training of fire fighters and pollution control inspectors require an exception to the 10 CSR 10-3.080. Smoke generating devices are exempt from the opacity rule only if a permit has been issued for the activity or no permit has been deemed necessary. This regulation was published in 10 CSR 10-3.080 on April 30, 1996. The air permit prohibits visible smoke off post. During smoke training activities, FLW will have personnel monitor smoke movement. They will be in communication with the operators, and smoke training activities will be stopped if necessary to ensure that visible smoke does not migrate off the installation.

The Missouri opacity regulation, 10 C.S.R. 10-3.080, prohibits emissions which impair visibility more than 20 percent. The Army originally sought a variance (exception) to this rule to allow obscurant training at 100 percent opacity at FLW. The MDNR recommended to the Missouri Air Conservation Commission (MACC) that the variance be granted. The Missouri Coalition for the Environment (the Coalition) requested a hearing. MACC held a two-day hearing, and thereafter granted the variance on June 6, 1996. The Coalition then appealed the variance to the Circuit Court for the Twenty-Second Circuit (City of St. Louis), the Honorable Robert H. Dierker presiding ("the Court").

On March 25, 1996, the Court found that MACC had improperly failed to consider possible health effects from the obscurant training and had excluded certain evidence at the hearing. The Court therefore ordered MACC to reopen the variance hearing to make further findings on the health issue and receive the additional evidence. The Court's ruling was appealed to the Missouri Court of Appeals by both the Coalition and by the U.S. Department of Justice.

Meanwhile, MDNR proposed to amend the opacity rule to provide an exemption for "smoke generating devices" whose sole purpose was the "creation and dispersion of particles in a gaseous medium." The proposed rule change was proposed on October 16, 1995, public hearings were held on December 7, 1995, and the final rule was published in Missouri Register on April 1, 1996. The rule change was

published in the Code of State Regulations on April 30, 1996. The exemption became effective as an official part of the Code of State Regulations on May 30, 1996. Because Army obscurant generators are qualified as "smoke generating devices" within the meaning of the exemption, Army obscurant generators used in training are exempt from the opacity rule and no longer require a variance. Accordingly, the Missouri Court of Appeals dismissed all variance litigation as moot (no longer a matter in controversy).

The Coalition has also filed appeals of the Army's air permits related to obscurant training and the CDTF incinerator. These appeals, which are independent of the opacity litigation, remain pending. Although the appeals were filed in June 1995, at the present time, the parties have not selected a hearing officer, discovery has not been completed, and no hearing date has been set. The Army's air permits remain valid and in full force and effect, subject to any further action which might be taken on the appeals.

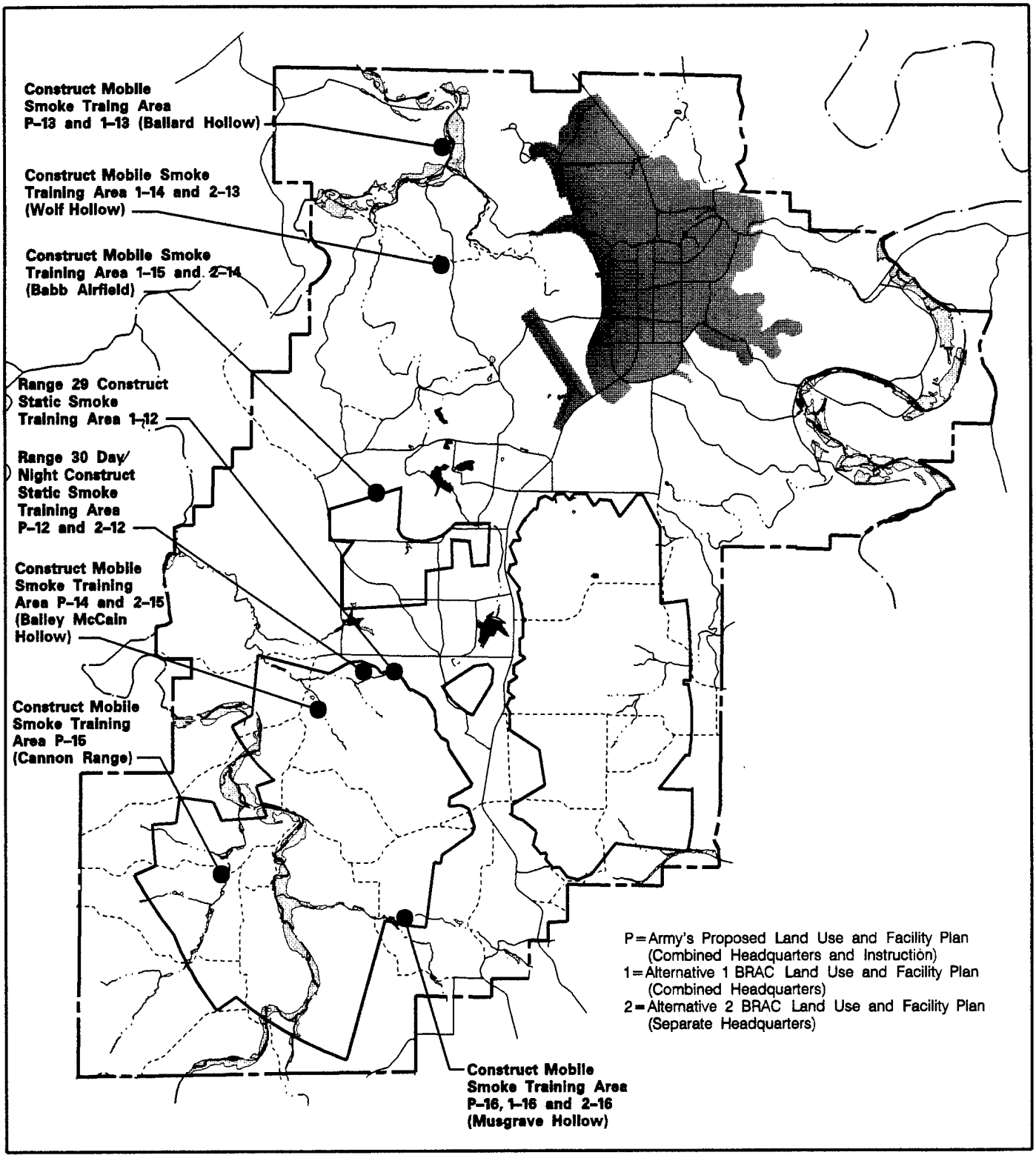
**Obscurant Training.** Fort Leonard Wood applied for and obtained an air construction permit from the MDNR, which required that FLW demonstrate compliance with the PSD requirements. Obtaining a PSD permit requires detailed air dispersion modeling. The air dispersion modeling for FLW was a two step process. The first step was to demonstrate that the fog oil training activities would not cause or contribute to a NAAQS violation. The second step was to ensure the PSD increments were not exceeded. The air dispersion modeling performed on the fog oil emissions was based on consuming, as a maximum, approximately 481 gallons (1,828 liters) daily (Burns, 1996). In a few instances, a possible exceedance of the NAAQS was predicted from existing sources although most exceedances were predicted 18 miles (30 km) or greater from the installation. Based on further analysis, FLW's proposed smoke training activities were not predicted to have a significant contribution to these predicted NAAQS exceedances. The fog oil training was predicted to consume all of the 24 hour PM-10 increment of 30 $\mu g/m^3$ and part (11 $\mu g/m^3$) of the annual PM-10 increment of 17 $\mu g/m^3$ at the FLW boundaries. This analysis is based on 3,700 pounds per day (approximately 3,700 lbs / day X 1 gal / 7.68 lbs = 481 gallons / day) and 65,000 gallons (247,000 liters) per year of fog oil usage respectively. The PSD PM-10 increment consumed beyond the installation property generally decreased with distance away from the installation. The maximum annual quantity of fog oil that could be used based on consumption of all the annual PM-10 increment is 100,454 gallons (65,000 X 17 / 11).

Alternative locations were not modeled or analyzed during the permit review to determine air quality impacts, but were used in the analysis of training sites for the EIS. It should be noted, that the air quality permit is location specific and any location changes would require FLW to pursue a permit modification. All sites in the Army's Proposed Land Use and Facility Plan (CH&I) are included in the current air permit. Alternative obscurant training sites are illustrated on Figure 5.5.

Ozone is a by-product pollutant resulting from the photochemical reaction of nitrogen oxides and volatile organic compounds. Ozone does not currently have any PSD increment program. Therefore, no modeling demonstration is needed for a higher fog oil usage. However, FLW is required under their PSD permit to monitor ozone (and PM-10). If either monitor shows potential NAAQS exceedances caused by FLW, MDNR has the right to modify or revoke the PSD permit.

Dispersion of a smoke plume is dependent on factors such as wind speed, surface roughness (terrain), atmospheric stability and mixing heights. Atmospheric stability is a measurement of turbulence in the atmosphere. The most common stability measurements are a combination of wind speed, cloud cover, cloud elevation, vertical temperature profile and the angle of the sun during daylight hours. This method is called the Pasquill-Gifford (P-G) method.

The P-G method has six stability classes typically labeled as A, B, C, D, E and F stability. A and B stabilities represent unstable conditions where there is a presence of convection. Convection is caused by heating of the earth's surface during daylight hours. Under unstable conditions, plumes will disperse quickly. Stability classes C and D represent neutral atmospheric conditions where there is little vertical movement of the air. Neutral conditions can occur during the day or night. Stability classes E and F are considered stable atmospheric conditions. Stable conditions typically occur from one hour before sunset to about one hour after sunrise. There is very little air movement of the air and plume dispersion is slow.




LEGEND:

- Cantonment Area
- Installation Boundary
- All Weather Road
- Seasonal Road
- Creek /River
- Intermittent Stream
- Range Boundary
- Wetland Area

N

0 10000 20000

Scale in Feet

HARLAND BARTHOLOMEW & ASSOCIATES, INC ST LOUIS, MISSOURI

KANSAS CITY DISTRICT US ARMY CORPS OF ENGINEERS KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

**ALTERNATIVE OBSCURANT TRAINING SITES**

DATE: **MARCH, 1997** FIGURE NO. **5.5**

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Besides the air monitoring, the air permit specifies training may only be conducted during certain meteorological conditions, stability classes, and wind directions depending on the training location. Training may be conducted during stability classes A, B, C, D, and E under specified wind speeds and directions. No smoke training may be conducted during stability condition F. Measures are in place to prevent visible smoke from crossing the property boundary. The smoke trainers will have observers watching smoke movement. The observers will be in radio contact with the smoke trainers. If the smoke movement is not toward the intended area and appears to be headed off installation property, smoke training will cease. Since the smoke operations will halt quickly, the smoke concentrations are not expected to cause visible off-post impacts. One of the 37 permit conditions is that the smoke training shall not contribute to a safety hazard to air traffic or vehicular traffic on highways accessible to the public during the training exercises. The fog oil air permit conditions are provided in Table 5.9 which is located on page 5-38.

The MDNR required FLW to conduct pre- and post-construction PM-10 monitoring. To confirm the modeled data, the permit requires ozone and PM-10 be monitored for two years once training commences. In addition, the installation is required to conduct one year of monitoring prior to the start of training for both PM-10 and ozone. Ozone, which is a seasonal pollutant, will be monitored during its peak impact period from April 1 to October 31. Monitoring points and a monitoring plan were developed in conjunction with MDNR. The locations are based on the highest predicted concentrations using the dispersion model (highest impact) or on specific sites identified by MDNR. The installation's current monitoring plan includes collecting ozone data near Dixon and collecting PM-10 data in three locations - one off the southern boundary of the installation (Highway TT), one in the east part of the Cantonment area, and one off the installation on Highway H. Results are required to be submitted quarterly to the MDNR Air Pollution Control Program. Besides the ambient air monitoring, permit conditions require quarterly soil and vegetation sampling for one year prior to the start of training and monthly sampling for two years after the start of training. The purpose of soil and vegetation monitoring is to provide an ongoing evaluation of potential impacts to soils and vegetation from deposition of fog oil residues through the monitoring of total petroleum hydrocarbon (TPH) concentration. Proposed soil and vegetation sampling sites are within Musgrave, Cannon Range (i.e. Mush Paddle), Ballard, and Bailey training areas, within a 0.9 miles (1.5 kilometer) buffer area around each training site and two random on-post sites. The Army has developed a Monitoring Plan Summary which has been included in Volume III, Appendix K. Both the ambient air monitoring plan and the soil and vegetation plan are still in draft form. Additionally, FLW will modify their existing Range and Training Area management activities to limit access during obscurant training. These management activities are further described in subsection 5.2.2.15.A.1.

The air quality permit contains fog oil material specifications. The fog oil shall contain no carcinogens or potentially carcinogenic constituents, plus it may not contain more than 0.5 percent by weight of any single hazardous air pollutant and the combination of all hazardous air pollutants may not be more than 1.0 percent by weight (see subsection 5.2.2.15.B). Fog oils manufactured before 1986 typically had high concentrations of toxic and carcinogenic aromatics (Katz, 1980), and posed a potential health threat to exposed individuals. In 1986, military specifications for SGF-2, were altered to require manufacturers to remove carcinogens and potential carcinogens from the oil (DA, 1986b). Fog oil used at FLW will, at a minimum, comply with a newer specification (DA, 1995b) which requires manufacturers to certify the oils they produce show no evidence of carcinogenicity based on required testing. Carcinogenicity of the oil is attributed to its polynuclear aromatic hydrocarbon (PAHs) constituents. Also, the noncarcinogenic dermal toxicity of petroleum derived fuels and mineral oils are mostly attributable to the aromatic fraction (includes PAH) as opposed to the aliphatic fraction (Neff, 1979; and ATSDR, 1995).

Separate from the EIS process, FLW will pursue an air permit modification, a process which will take 1-2 years because of the additional studies which will be executed. It is therefore not reasonable to complete the permit modification prior to completion of the EIS. Until the permit is modified, FLW will comply with the existing air permit. MDNR approval will be required for any modifications to the current air permit, plus a public hearing will be required to inform the public of any potential changes.

In the mean time, the Army has initiated additional studies and programs to evaluate the assumptions used in the existing permit and will refine the assumptions to better depict actual conditions of the training during modeling simulations. Any subsequent refinement of these assumptions could alter the air quality analysis and will be documented when FLW requests renewal or modification of their existing PSD air quality permit. ***However, it should be noted, the 24 hour PM-10 PSD increment will remain as 30 μg/m3 and annual PM-10 increment of 17 μg/m3 (as set by the Clean Air Act) and the air permit (either existing or revised) will ensure that this limit is not exceeded.*** Only the assumptions used to derive the predicted impacts will be evaluated and possibly revised. The PM-10 impacts from fog oil training must not exceed the 24 hour (30 μg/m3) and the annual (17 μg/m3) PM-10 increment, thus ensuring both the PSD increment and the National Ambient Air Quality Standards are met. Compliance with the PSD air permit (either existing or revised) in conjunction with the ambient air monitoring will ensure these standards are met.

In support of pursuing a revised air permit to expand the daily limit to approximately 1,200 gallons (4,560 liters) and the annual limit to up to 84,500 gallons (321,100 liters), FLW will:

- develop source specific data through ambient air monitoring to ensure NAAQS are not being exceeded;
- evaluate the 70 percent particulate and 30 percent VOC fog oil emission assumption;
- obtain background ambient air data for FLW;
- evaluate existing, available models to better characterize the fog oil plume behavior;
- request revision of the permit to include the use of smoke pots in conjunction with fog oil training (there are currently no plans to use smoke grenades in conjunction with fog oil training); and
- compare current baseline PM-10 ambient air monitoring to post BRAC activity PM-10 ambient air monitoring to show the change in PM-10 still meets the NAAQS.

Table 5.9 provides a summary of Fog oil air permit conditions, a copy of the fog oil permit is located in Volume III, Appendix J.

**Table 5.9:**
**Summary of Fog Oil Air Permit Conditions**

| Condition # | Permit Condition | Requirement Summary |
|---|---|---|
| | | **Emissions Limitations** |
| 1 | Annual Throughput | No more than 65,000 gallons (247,000 liters) per year of SGF-2 fog oil during any 12-month period. |
| 2 | Daily Throughput | No more than 3700 pounds SGF-2 fog oil during any 24-hour period and no more than 3700 pounds per hour. |
| 3 | SGF-2 Fog Oil Material Requirements | Only SGF-2 fog oil can be used. Permit contains fog oil specifications including processing methods, carcinogen content, and HAPS content. Cannot introduce other substances in the fog oil (e.g. kerosene during cold weather, graphite/brass for obscurant modification) |
| 4 | Fog Oil Material Certification | Must maintain fog oil MSDS and records of analytical test data to demonstrate compliance with condition #3. Must certify no less frequently than annually to MDNR that all fog oil used in training complies with condition #3. |
| 5 | Reporting Of Violations | Must report to MDNR within 10 days if fog used in training does not meet conditions #3 or #4. |
| 6 | Smoke Generating Equipment | Training can only use Model M3A3 generator, using gasoline. Equipment must be maintained in good working condition.<br><br>Note: MDNR letter issued 12 June 1995 allows functionally equivalent generator equipment provided emissions do not change in type or increase. Fort Leonard Wood plans to use fog oil generators which use diesel fuel, thus FLW will be required to pursue a modified permit to allow the use of diesel fuel. |
| 7 | Emissions Limitation | Particulate matter (PM-10) can't be emitted greater than 2600 pounds per hour (assumes 70% of 3700 pounds per hour in condition #2). |

**Table 5.9:**
**Summary of Fog Oil Air Permit Conditions**

| Condition # | Permit Condition | Requirement Summary |
|---|---|---|
| 8 | Record keeping | Requires recording the quantity of fog oil used during the previous month and the previous 12 months. Also requires daily and hourly consumption record keeping. |
| 9 | Reporting Of Violations | Must report to MDNR no later than 10 days after the end of the month if the preceding 12 months cumulative total is greater than 65,000 gallons (247,000 liters) (Condition #1). |
| 10 | Reporting Of Violations | Must report to MDNR no later than 10 days after an exceedance of the 3700 pound daily and hourly rate of fog oil (Condition #2). |
| | | **Ambient Air Monitoring** |
| 11 | Quality Assurance Project Plan (QAPP) | A QAPP shall be submitted within 90 days of the issuance of the permit. It shall describe method and manner for collecting PM-10 and ozone ambient air monitoring data.<br><br>Note: The original QAPP was submitted to MDNR on August 29, 1995. |
| 12 | Pre-Startup Monitoring | One year of monitoring shall be conducted in a manner and at the locations as approved by MDNR. Data shall be collected no later than 18 months prior to the beginning of training. Ozone monitoring is only required between April 1 and October 31.<br><br>Note: PM-10 and ozone data has been collected since October 1996. |
| 13 | Reporting | Ambient air monitoring data shall be submitted to MDNR no less frequently than quarterly. All monitoring data required in Condition #12 shall be submitted no later than 60 days prior to the commencement of smoke training.<br><br>Note: October through December, 1996 monitoring reports have been submitted to MDNR. |
| 14 | Corrective Action | If the ambient air monitoring data in Condition #12 does not conform to the predicted values from the dispersion modeling or if smoke training is shown to contribute to a violation of the NAAQS, MDNR may require corrective action or may revoke the permit. |
| 15 | Post-Startup Monitoring | Ambient air monitoring for PM-10 and ozone shall begin with the commencement of training and shall last for two years. Ozone monitoring is only required between April 1 and October 31. |
| 16 | Reporting | Ambient air monitoring data shall be submitted to MDNR no less frequently than quarterly. |
| | | **Meteorological Monitoring** |
| 17 | Observers | During smoke training, a network of observers shall be stationed at locations to observe the smoke behavior and whether smoke crosses FLW boundaries. Continuous electronic or visual communications must be maintained with the smoke generator operators. |
| 18 | Meteorological Monitoring | For no less than one hour prior to training, during training, and no less than one hour after training, FLW shall monitor ambient air temperature, atmospheric pressure, relative humidity, atmospheric stability, mixing height, wind speed, and wind direction at each training site at which training is conducted. Monitoring records must be maintained at FLW.<br><br>Note: Meteorological monitoring data has been collected since October 1996 and submitted to MDNR. |
| 19 | Limitations On Operations | Smoke training can only occur at certain locations (i.e. Musgrave, Ballard, Mush Paddle, and Bailey) under specified meteorological conditions. Training cannot occur at more than one location simultaneously. |
| 20 | Meteorologists | Meteorological monitoring and forecasting must be coordinated and supervised by a trained meteorologist. |
| 21 | Forecasting Acceptable Conditions | Smoke training can only occur if the meteorologist has predicted no earlier than two hours before training is to be conducted that the conditions approved in the permit will exist throughout the training exercise. |

**Table 5.9:**
**Summary of Fog Oil Air Permit Conditions**

| Condition # | Permit Condition | Requirement Summary |
|---|---|---|
| 22 | Forecast Certification | Prior to each training exercise, the meteorologist shall certify in writing the pre-exercise forecast. Records shall be maintained by FLW. |
| 23 | Pre-Exercise Computer Modeling | Prior to each training exercise, FLW shall use computer modeling to predict smoke behavior during the anticipated exercise. Printouts must be maintained by FLW. |
| 24 | Prohibitions | Smoke generation shall cease if meteorological conditions are not within those approved for smoke training, smoke behavior differs from prediction in Condition #23 as to indicate potential visible smoke movement beyond FLW boundary, NAAQS potentially may be exceeded, there is an interruption for two minutes in meteorological monitoring, or under conditions that may be determined by MDNR. |
| **Soil And Vegetation Sampling** | | |
| 25 | Soil And Vegetation Sampling Plan (SVSP) | Within 180 days of permit issuance, a SVSP must be submitted to MDNR.<br><br>Note: The original Soil and Vegetation Plan was submitted to MDNR on November 28,1995. |
| 26 | Pre-Startup Sampling | One year of monitoring shall be conducted in a manner and at the locations as approved by MDNR no less than quarterly.<br><br>Note: Soil and vegetation monitoring is expected to begin in February 1997. |
| 27 | Reporting | All monitoring data required in Condition #26 shall be submitted within 60 days of the date samples are collected. All sampling data required in Condition #26 shall be submitted no later than 60 days prior to commencement of smoke training. |
| 28 | Post-Startup Sampling | Upon commencement of training, sampling must occur no less frequently than monthly. After two years, FLW may petition to have the sampling schedule and frequency modified. |
| 29 | Reporting | Monitoring data shall be submitted to MDNR no less frequently than quarterly. |
| 30 | Corrective Action | MDNR may revise the permit conditions or require corrective action if the results of the soil, vegetation, or ambient air monitoring indicate adverse deposition effects. |
| **Other Special Conditions** | | |
| 31 | Record Retention | All records must be maintained by FLW for no less than 10 years from the date the record is created. |
| 32 | Public Information | A public informational meeting shall be conducted to present the results of the monitoring described in Conditions #12 and #26. |
| 33 | Effects On Visibility | Smoke training shall not constitute or contribute to a safety hazard to air traffic or vehicular traffic on highways accessible to the public during a training exercise. |
| 34 | Reporting Of Violations | Any noncompliance with the permit must be reported to MDNR within 10 days. |
| 35 | Corrective Action | If appropriate MDNR may require corrective action to mitigate the emission of PM-10 or the impact of ozone. Fort Leonard Wood shall implement the plan immediately upon approval of the plan by MDNR. |
| 36 | Compliance With Other MDNR Permits | Fort Leonard Wood must comply with the sampling and monitoring conditions of Operating Permit # MO-0117251 (i.e. the NPDES Water Permit). |
| 37 | Notification Of Commencement Of Smoke Training | Fort Leonard Wood shall not commence smoke training without notification to MDNR at least 30 day prior. The notification shall include certification that FLW has satisfied all conditions precedent to the commencement of training as described in the permit. |

*Source: Harland Bartholomew & Associates, Inc from MDNR Air Permit #0695-010*

**5.2.2.3.7.1 RCP Alternative.** Under the current practice at FMC, the total amount of fog oil used would be up to 125,500 gallons (476,900 liters) per year with a maximum daily use of up to 1,900 gallons (7,220 liters). The difference between the RCP and the other viable training alternatives (OPTM, EPTM and mitigated option) involves the amount of obscurant (fog oil) that is used to complete the training. It should be noted that regardless of the training alternative selected, FLW will comply with the requirements of the

MDNR air permit that applies at the time training is conducted. The air permit conditions are all federally enforceable. Failure to meet the conditions could result in fines and/or reduction in fog oil training.

- **Direct Impacts.** The current MDNR Air Permit limits the total quantity of fog oil use to 65,000 gallons (247,000 liters) per year and 3,700 pounds (approximately 481 gallons (1,929 liters)) per day, consequently implementation of this training method would require the installation to pursue a modified permit that would allow for the use of up to 125,500 gallons (476,900 liters) per year and 1,900 gallons (7,220 liters) per day. The PM-10 annual increment limits usage to 100,454 gallons (381,725 liters) per year. Thus, this alternative would exceed both the yearly and daily PM-10 increment. The quantity of air emissions is provided in Table 5.10. Ambient air quality impacts are provided in Table 5.11. The RCP has been classified as a long-term significant adverse impact to air quality. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60, located in subsection 5.5.5. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K. The air emissions from the vehicles are criteria pollutants. Mobile sources do not require any air permitting, thus air emissions were not quantified. See subsection 5.4.2.3.2 for further discussion of mobile sources.

- **Indirect Impacts**. An increase in ozone is expected because VOCs are known precursors to ozone formation. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.7.2 OPTM (Army's Proposed Action) Alternative.** This alternative is identical to the RCP Alternative except that the volume of fog oil is reduced to 84,500 gallons (321,000 liters) per year with a maximum daily amount of 1,200 gallons (4,560 liters). It should be noted that regardless of the training alternative selected, FLW will comply with the requirements of the MDNR air permit that applies at the time training is conducted.

- **Direct Impacts.** The quantity of VOCs and PM-10 emissions would be reduced compared to the RCP Alternative proportional to the reduced volume of fog oil used. The current MDNR Air Permit limits the total quantity of fog oil use to 65,000 gallons (247,000 liters) per year and 3,700 pounds (approximately 481 gallons (1,828 liters)) per day. The installation would be required to submit an application to MDNR to pursue a modified permit. This permit modification may require additional air dispersion modeling to demonstrate compliance with NAAQS and PSD increment of higher quantities. The environmental effects of using 65,000 gallons (247,000 liters)per year are expected to be less than those from the 84,500 gallons (321,000 liters) analyzed under the OPTM Alternative. Obscurant training under this alternative would exceed the daily PM-10 PSD increment. The quantity of air emissions is provided in Table 5.10. Ambient air quality impacts are provided in Table 5.11. Because of the 1,200 gallon (4,560 liters) daily amount, the impact is classified as long-term significant adverse. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60 located in subsection 5.5. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K. The air emissions from the vehicles are criteria pollutants. Mobile sources do not require any air permitting, thus air emissions were not quantified. See subsection 5.4.2.3.2 for further discussion of mobile sources. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

**Table 5.10:**
**Estimated Annual Air Emissions from the Fog Oil Training[1]**

| Pollutant | PM-10 | Sulfur Dioxide | Nitrogen Oxides | Carbon Monoxide | VOCS |
|---|---|---|---|---|---|
| **RCP** | | | | | |
| Fog Oil | 337 | - | - | - | 145.00 |
| Generator Exhaust (Diesel) | 0.11 | 1.33 | 1.61 | 0.37 | 0.11 |
| Smoke Pots | 4.54 | - | - | 0.17 | - |
| Unpaved Roads | 16.20 | - | - | - | - |
| Total (RCP) | 357.85 | 1.33 | 1.61 | 0.54 | 145.11 |
| **OPTM** | | | | | |
| Fog Oil | 227.00 | - | - | - | 97.00 |
| Generator Exhaust (Diesel) | 0.08 | 0.90 | 1.09 | 0.25 | 0.08 |
| Smoke Pots | 4.54 | - | - | 0.17 | - |
| Unpaved Roads | 10.90 | - | - | - | - |
| Total (OPTM) | 242.51 | 0.90 | 1.09 | 0.42 | 97.08 |
| **EPTM** | | | | | |
| Fog Oil | 133.00 | - | - | - | 57.00 |
| Generator Exhaust (Diesel) | 0.05 | 0.53 | 0.64 | 0.14 | 0.04 |
| Smoke Pots | 4.54 | - | - | 0.17 | - |
| Unpaved Roads | 6.40 | - | - | - | - |
| Total (EPTM) | 143.98 | 0.53 | 0.64 | 0.31 | 57.04 |

Note: 1 All data is in tons per year

*Source: Harland Bartholomew & Associates, Inc.*

**Table 5.11:**
**Fog Oil Training Alternative Summary and Ambient Air Quality Impact Analysis**

| | PSD Permit | RCP | OPTM | EPTM |
|---|---|---|---|---|
| Gallons Per Year | 65,000 | 125,500 | 84,500 | 49,500 |
| Gallons Per Day | 481 | 1,900 | 1,200 | 1,200 |
| Gallons Per Hour | 481 | 1,900 | 1,200 | 1,200 |
| Pounds Fog Oil Per Hour | 3,700 | 14,592 | 9,216 | 9,216 |
| Pounds PM-10 Per Hour | 2,600 | 10,214 | 6,451 | 6,451 |
| 24 Hour PM-10 Increment Standard ($\mu$g/m3) | 30 | 30 | 30 | 30 |
| 24 Hour Ambient Air Impact ($\mu$g/m3) | 30 | 196 | 129 | 129 |
| Annual PM-10 Increment Standard ($\mu$g/m3) | 17 | 17 | 17 | 17 |
| Annual Ambient Air Impact ($\mu$g/m3) | 11 | 35 | 25 | 15 |

Notes:
1) The ambient air impacts for the existing PSD Permit include emissions from: 1) fog oil and 2) generator exhaust.
2) The ambient air impacts for the RCP, OPTM, and EPTM Alternatives include emissions from: a) fog oil; b) smoke pots; c) generator exhaust; and d) unpaved roads.
3) Cumulative impacts are discussed in subsection 5.5.
4) Modeling results for FLW should not be compared to FMC because of differences in meteorological conditions, ambient air receptor locations and elevations, other surrounding particulate sources on-post and off-post, and background data, etc.

*Source: Harland Bartholomew & Associates, Inc*

- **Indirect Impacts.** The quantity of ozone formation is anticipated to be reduced compared to the RCP Alternative. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.7.3 EPTM Alternative.** This alternative would result in further reductions in the annual volume of fog oil used to 49,500 gallons (188,100 liters) per year but the maximum daily amount of 1,200 gallons (4,560 liters) would be the same as the OPTM. It should be noted that regardless of the training alternative selected, FLW will comply with the requirements of the MDNR air permit that applies at the time training is conducted.

- **Direct Impacts.** The quantity of VOCs and PM-10 emissions would be reduced compared to the RCP Alternative and OPTM (Army's Proposed Action) Alternative proportional to the reduced volume of material used. The current MDNR Air Permit limits the total quantity of fog oil use to 65,000 gallons (247,000 liters) per year and 3,700 pounds (approximately 481 gallons (1,828 liters)) per day. The installation would be required to pursue a modified permit since implementation of this alternative would exceed the daily PM-10 increment but not the annual PM-10 increment. The quantity of air emissions is provided in Table 5.10. Ambient air quality impacts are provided in Table 5.11. Because of the 1,200 gallon (4,560 liters) daily amount, the impact is classified as long-term significant adverse. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60, located in subsection 5.5.5. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K. The air emissions from the vehicles are criteria pollutants. Mobile sources do not require any air permitting, thus air emissions were not quantified. See subsection 5.4.2.3.2 for further discussion of mobile sources. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

- **Indirect Impacts.** The quantity of ozone formation is anticipated to be reduced compared to either the RCP Alternative or the OPTM (Army's Proposed Action) Alternative. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.8 Issue: *Mobile Source Air Emissions From Vehicle Operations.*** Instruction in TG 11.1 Vehicle Operations, Driver Qualification involves the use of vehicles which are classified as mobile sources. This training activity is described in Volume IV, Table IV.2. Typical air emissions from mobile sources include both criteria pollutants and hazardous air pollutants.

**5.2.2.3.8.1 RCP Alternative.** The RCP Alternative includes basic instruction to the operation of vehicles, including unique military vehicles. This training includes driving practice in both tactical and non-tactical environments.

- **Direct Impacts.** The vehicle mix includes HMMWV, 2.5 and 5 ton trucks, pickup trucks, FOXs, Armored Personnel Carriers, sedans, forklifts, and semi-tractor trailers. Both gasoline and diesel fuel powered engines are used. The actual emissions will depend of many factors such as vehicle age, total vehicle miles traveled, average speed, cold/hot start frequency, etc. Mobile sources do not require operating permits. See subsection 5.4.2.3.2 for further discussion of mobile sources. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

- **Indirect Impacts.** Because this source emits NOx and hydrocarbons, indirect effects includes contributing to the formation of ground level ozone. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.8.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM Alternatives include basic instruction to the operation of vehicles, including unique military vehicles, in both tactical and non-tactical environments. This training alternative is identical to the RCP Alternative except that it may use driving simulators, when developed, to augment existing driving training.

- **Direct Impacts.** Training on the simulators will decrease the amount of training performed in the field under the RCP Alternative thus resulting in a reduction in air emissions. It is estimated that the operation of vehicles on unpaved roads from the Military Police would result in 31 tons per year of PM-10 emissions. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

- **Indirect Impacts.** Because this source emits NOx and hydrocarbons, indirect effects include contributing to the formation of ground level ozone. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.9 Issue: *Mobile Source Air Emissions From Evasive Driving.*** Instruction in TG 11.2 Evasive Driving involves the use of vehicles which are classified as mobile sources. This training activity is described in Volume IV, Table IV.2. Typical air emissions from mobile sources include both criteria pollutants and hazardous air pollutants from vehicular fuel combustion.

**5.2.2.3.9.1 RCP and OPTM (Army's Proposed Action) Alternatives.** The RCP and OPTM (Army's Proposed Action) Alternatives include functional instruction in vehicle handling to perform evasive maneuvers. This training includes actual driving practice to develop proficiency.

- **Direct Impacts.** The vehicle mix is comprised primarily of light-duty gasoline-powered vehicles (LDGVs). A LDGV is defined as any gasoline fueled vehicle designed for the transportation of people with a capacity 12 or less. Typical air emissions from these vehicles include both criteria pollutants and hazardous air pollutant emissions from fuel combustion. The actual emissions will depend of many factors such as vehicle age, total vehicle miles traveled, average speed, cold/hot start frequency, etc. Mobile sources do not require any permits. See subsection 5.4.2.3.2 for further discussion of mobile sources. In addition, there will be additional particulate emissions due to the construction activities associated with the training facility. The road particulate emissions from Evasive Driving are assumed to be negligible because all training is conducted on paved roads, none is conducted on unpaved roads. Fort Leonard Wood is required to perform PM-10 ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

- **Indirect Impacts.** Because this source emits NOx and hydrocarbons, indirect effects include contributing to the formation of ground level ozone. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.9.2 EPTM Alternative.** The EPTM Alternative is similar to the RCP and OPTM (Army's Proposed Action) Alternatives, except that it would eliminate the construction and use of interior classrooms and continue this training in an exterior environment.

- **Direct Impacts.** This alternative will result in less short-term particulate emissions because there will be no construction activities. Fort Leonard Wood is required to perform PM-10 and ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

**5.2.2.3.10 Issue: *Emission Of Odors From Fog Oil.*** Fog oil emissions will produce an odor which is light petroleum in nature, similar to turpentine or mineral spirits. The odor is detectable if one is in

the obscurant cloud and it is visible, however a slight odor may also be detectable at concentrations which are not visible. Detectable odor levels vary depending on the individual exposed. The detectable odor concentration level is currently unknown, therefore the region of influence is unpredictable. Odors are regulated by 10 CSR 10-3.090 which restricts the concentration, duration and frequency. An adverse impact is not anticipated due to the restrictions placed on fog oil training. If the Missouri Department of Natural Resources (MDNR) receives more than three complaints within any three month period from citizens concerning different occurrences of odors emanating from fog oil training sites, and if these complaints can be verified by MDNR representatives at the location of the reported occurrences, Fort Leonard Wood will be notified that corrective action is required. If this occurs, Fort Leonard Wood will submit a corrective action plan within thirty (30) days of notification from MDNR. The plan would be implemented following approval by MDNR.

There are three distinct training operations which result in fog oil emissions: TG 7.2 Obscurant, Employment Operations Basic (Static); TG 7.3 Obscurant, Employment Proficiency Test (Mobile Operations); and TG 7.4 Obscurant, Employment Proficiency Test (Field Training Exercises). These training activities are described in Volume IV, Table IV.2. For purposes of this section, all three TG's will be combined. The difference among the three alternatives is the quantity of fog oil to be used.

**5.2.2.3.10.1 RCP Alternative.** As outlined in subsection 5.2.2.3.7.1 the RCP Alternative for these TGs would result in emissions of up to 125,500 gallons per year with a maximum daily use of up to 1,900 gallons.

- **Direct Impacts.** Individuals positioned at the training site will smell a definite petroleum based odor. This is a short term adverse impact since the odor will dissipate. Odor dissipation will be strongly dependent on the wind speed and direction.

- **Indirect Impacts.** Individuals positioned away from fog oil training areas, but within the boundaries of FLW, and those outside the facility boundaries will have a slight potential for exposure to fog oil at concentrations that would create an odor. Factors which serve to assure insignificant odor beyond training ranges are: 1) the location of training ranges in relation to on-post Cantonment area and post boundaries; 2) fog oil operating permit conditions which restrict the wind directions and meteorological conditions under which training is allowed at each training area (subsection 5.2.2.3.7); and 3) the rapid dispersion of visible fog oil to low concentrations that usually will not create a detectable odor. This is a short term adverse impact since the odor will dissipate.

**5.2.2.3.10.2 OPTM (Army's Proposed Action) Alternative.** As outlined in subsection 5.2.2.3.7.2 the OPTM (Army's Proposed Action) Alternative for these TGs would result in emissions of up to 84,500 gallons per year with a maximum daily use of up to 1,200 gallons. Both the direct and indirect impacts associated with the presence of fog oil and (as stated in the RCP Alternative discussion above) are anticipated to be short term adverse. This alternative which results in reduced emissions will have a reduced potential for short term adverse impacts when compared to the RCP Alternative.

**5.2.2.3.10.3 EPTM Alternative.** As outlined in subsection 5.2.2.3.7.3 the EPTM Alternative for these TGs would result in emissions of up to 49,500 gallons per year with a maximum daily use of up to 1,200 gallons. Both the direct and indirect impacts associated with the presence of fog oil (as stated in the RCP Alternative discussion above) are anticipated to be short term adverse. This alternative results in reduced emissions and reduced potential for short term adverse impacts when compared to either the RCP Alternative or the OPTM (Army's Proposed Action) Alternative.

**5.2.2.3.11 Issue: *Air Emissions From Miscellaneous Class Support Materials.*** The materials identified in this section are used in a variety of training objectives. The materials include miscellaneous chemicals for training, maintenance, cleaning etc. Volume III, Appendix B, Table B.5 provide more detailed usage and safety information associated with these miscellaneous class support materials. The types and quantities of these materials remain identical regardless of the training

alternative selected for implementation. Table 5.12 includes the fugitive emissions from all miscellaneous materials used for multiple training missions.

**Table 5.12:**
**Estimated Emissions from Miscellaneous Chemical Usage**

| Chemical Type | Application | Quantity Used Per Year | VOC Emissions (lbs/yr) |
|---|---|---|---|
| Ethyl 2-Cyanoacrylate | Fingerprinting - MP School | 200 ounces | 13.4 |
| FC-43, Fluorinert | Electronics Cleaning - Multiple TG | 18 ounces | 1.2 |
| | | Total Emissions (lbs/yr) = | 14.6 |
| | | Total Emissions (ton/yr) = | 0.01 |

*Source: Harland Bartholomew & Associates, Inc.*

- **Direct Impacts.** The emissions from miscellaneous materials used for multiple training missions (Table 5.12) are below the State of Missouri air permitting de minimis levels (see Table 5.2) which are defined as emission levels less than or equal to the rates listed in 10 CSR 10-6.020. Subsection 5.2.2.10.1 contains additional information concerning air permitting, and Volume III, Appendix B contains additional usage and safety information on these materials.

- **Indirect Impacts.** Because this source emits VOCs, indirect effects include contributing to the formation of ground level ozone. Fort Leonard Wood is required to perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K.

## 5.2.2.4 Noise

Implementation of the planned training missions of the Military Police School and Chemical School at the Army's Proposed LU & FP (CH&I) locations will result in the following issues in regard to Noise:

- Modification of Installation Compatible Use Zones (ICUZ);
- Mobile source (vehicular) noise; and
- Noise impacts on other biological resources.

**5.2.2.4.1 Issue: *Modification of Installation Compatible Use Zones.*** As discussed in subsection 4.4.1.1, the Army has developed the ICUZ program for areas on and near its installations which may be adversely affected by noise.

**5.2.2.4.1.1 RCP and OPTM (Army's Proposed Action) Alternative.**

- **Direct Impacts.** Included in this issue are the impacts associated with: 1) aircraft operations; 2) maintenance facilities; 3) ordnance demolition; and 4) the use of large and small caliber weapons firing range.

  1) **Aircraft Operations Noise.** Implementation of proposed training actions (as described in Section 3 and Volume III, Appendix B, Table B.2) indicates there will be a slight increase for the level or type of aircraft operations at Forney Army Airfield, primarily related to minor logistics for senior officials at the Military Police and Chemical Schools. There will be no direct or indirect adverse impacts on the existing ICUZ contours (as illustrated on Figure 4.4) associated with Forney Army Airfield.

  2) **Maintenance Facilities.** Maintenance facilities, and their associated maintenance activities, can result in objectionable noise levels. Maintenance facilities should therefore be isolated from noise sensitive land use zones. Consequently, during the development of the 1990

Master Plan for FLW (FLW, 1991c) consideration of this issue resulted in the collocation of maintenance activities in several Industrial land use zones. These zones provided consolidated areas that were buffered from nearby noise-sensitive land uses, eliminating noise conflicts. Maintenance training activities directly related to other training were designated as compatible with the nearby associated training and located within training land use areas. For example, heavy equipment maintenance training is a integral part of heavy equipment operation training, and therefore the location of these maintenance training facilities at Normandy Training Area is considered to be compatible with the other training activities in the area.

3) **Ordnance Demolition.** Noise generated by ordnance demolition will result in changes to the Noise Zone II and III areas associated with this training (USACHPPM, 1996). Explosive Ordnance Disposal (EOD) training is the only training currently conducted at FLW in which the goal of the training is ordnance demolition. This training is currently conducted at Range 36. This training is limited to initial and refresher instruction of EOD personnel in the proper methods of locating, securing, isolating and disposing of ordnance. Under each of these alternatives, the existing EOD training at FLW would be expanded to include training of personnel on the proper procedures for handling the weapons systems used by Military Police and Chemical specialists that are not currently used by Engineer specialists.

   Additional EOD training on the types of weapons systems used by Military Police and Chemical specialists that are not currently used at FLW will only slightly increase the duration of the existing noise levels at Range 36. However, the additional training is not anticipated to enlarge the size or alter the location of the existing Noise Zone II and III areas for the range and therefore, the impact is negligible (USACHPPM, 1996).

4) **The Use of Large and Small Caliber Weapons Firing Range.** Implementation of the TGs associated with the Military Police School and the Chemical School at FLW will introduce new weapons and explosives-related training requirements to FLW. These requirements involve the use of additional quantities of ammunition and explosives, as well as the introduction of new ammunition and explosive types to FLW. Depending upon the training alternative selected, the number and type of ammunition used in weapons familiarization and qualification will very.

   The amount of additional ammunition and explosives that will be used under the RCP and OPTM (Army's Proposed Action) Alternatives at FLW is summarized on Table 5.13. As noted in the table, the primary difference between the training alternatives is the type and amount of Mark 19 ammunition (40 mm high explosive and 40 mm training practice rounds) used in training. Each of these alternatives will involve the use of the other, additional ammunition and explosives listed on Table 5.6. Use of these items will change the established Noise Zone II areas associated with the use of weapons familiarization and qualification ranges. The location and shape of the new noise contours is dependent upon the ranges and training areas that will be used for individual activities. Consequently, the discussion concerning the shape of these new noise contours is contained in subsection 5.3. Additionally, under each of these alternatives students will be instructed in the use of individual and crew-served weapons (with crew-served weapons being defined as those weapons that require more than one person to operate). Weapons that personnel will be trained on include .308 Cal, .38 Cal, .50 Cal, AT4 anti-tank weapon, 12 gauge shotgun, M16, M60/M240 machine gun, FOX machine gun, M249 squad assault weapon, M250 grenade launcher, M203 grenade launcher and Mark 19. This training will be carried out, in part, on live-fire weapons familiarization and qualification ranges.

Footnotes referenced in Table 5.13 appear at the end of the table.

**Table 5.13:**
**Ammunition Requirements for the RCP and OPTM (Army's Proposed Action) Alternative [1]**

| Type of Ammunition or Explosive | Army Class | Quantity Currently Used at FLW [2] | Additional BRAC requirements [2] | Percent Increase | Remarks |
|---|---|---|---|---|---|
| **Ammunition** | | | | | |
| 12 gauge shotgun | A011 | 538 | 42,881 | 7,970.4 | |
| 5.56 mm ball | A059 | 0 | 1,584,005 | n/a | |
| 5.56 mm tracer | M063 | 0 | 52,200 | n/a | |
| 5.56 mm ball | A071 | 10,095,213 | 29,600 | 0.3 | for M16A1/M16A2 |
| 5.56 mm blank | A080 | 1,677,717 | 1,434,018 | 85.5 | for M16A1/M16A2 |
| 5.56 ball tracer rounds | A068 | 429,248 | 0 | 0.0 | for M16A1/M16A2 |
| 7.62 mm blank linked | A111 | 163,961 | 538,200 | 328.2 | for M60/M240 training |
| 7.62 mm ball linked (4 ball plus 1 tracer round) | A131 | 958,082 | 652,600 | 68.1 | |
| 7.62 mm ball | A136 | 2,010 | 4,754 | 236.5 | |
| 7.62 mm ball linked for machine gun | A143 | 29,355 | 18,800 | 64.0 | for M60 |
| 7.62 mm 4 ball | A151 | 164,680 | 76,800 | 46.6 | |
| 0.30 mm ball | A212 | 429 | 0 | 0.0 | |
| 9 mm practice AT-4 | A358 | 84,524 | 17,946 | 21.2 | for AT-4 |
| 9 mm ball pistol | A363 | 73,537 | 1,021,737 | 1,389.4 | |
| 0.38 caliber blank (sentry dog) | A403 | 0 | 16,800 | n/a | |
| 0.50 caliber ball 1 tracer | A520 | 40,625 | 0 | 0.0 | |
| 0.50 caliber cartridge chamber ball machine gun | A552 | 10 | 0 | 0.0 | |
| 0.50 caliber ball | A555 | 200 | 0 | 0.0 | |
| 0.50 caliber (4 ball with 1 tracer round) | A557 | 27,044 | 88,299 | 326.5 | |
| 0.50 caliber blank for machine gun | A598 | 5,350 | 0 | 0.0 | |
| 0.50 caliber plastic | A602 | 24 | 0 | 0.0 | |
| 40 mm practice M781 | B519 | 27,502 | 9,638 | 35.0 | |
| 40 mm high explosive duel purpose low pressure | B546 | 21,024 | 279 | 1.3 | |
| 40 mm high explosive | B571 | 0 | 4,404 | n/a | |
| 40 mm training practice M918 | B584 | 13,608 | 118,216 | 868.7 | |
| 40 mm sub-caliber for Combat Engineer Vehicle | B592 | 162 | 0 | 0.0 | |
| Cartage 84 mm M136 AT-4 and launcher | C995 | 134 | 43 | 32.1 | |
| 165 mm training practice M623 | D590 | 360 | 0 | 0.0 | |
| **Smoke Grenades and Explosives** | | | | | |
| Grenade smoke screening | G815 | 0 | 48 | n/a | |
| Grenade & launcher smoke | G826 | 0 | 36 | n/a | |
| Fuze hand grenade, practice | G878 | 251,988 | 66,571 | 26.4 | |
| Grenade hand fragmentation M67 | G881 | 36,531 | 7,743 | 21.2 | |
| Grenade hand incendiary | G900 | 121 | 28 | 23.1 | |

**Table 5.13:**
**Ammunition Requirements for the RCP and OPTM (Army's Proposed Action) Alternative [1]**

| Type of Ammunition or Explosive | Army Class | Quantity Currently Used at FLW [2] | Additional BRAC requirements [2] | Percent Increase | Remarks |
|---|---|---|---|---|---|
| Grenade hand smoke, HC | G930 | 0 | 0 | 0.0 | Uses HC, will be phased out of use by FY 99 and replaced by the M83 which uses terephthalic acid |
| Grenade hand smoke, TPA, M83 [3] | M83 | 1,612 | 1,524 | 94.5 | Replacement for the G930 which used HC |
| Grenade hand smoke, Green (MILES) | G940 | 467 | 3,297 | 706.0 | |
| Grenade hand smoke, Yellow | G945 | 623 | 1,404 | 225.4 | |
| Grenade hand smoke, Red | G950 | 311 | 487 | 156.6 | |
| Grenade hand smoke, Violet | G955 | 585 | 240 | 41.0 | |
| Grenade hand riot, CS (Tear) | G963 | 730 | 1,396 | 191.2 | |
| Grenade hand smoke, M82 (TI02) | G978 | 0 | 48 | n/a | Infrared obscurant (TI02) |
| Motor rocket 5 inch | J143 | 7 | 0 | 0.0 | |
| Actual anti-tank mine | K002 | 124 | 0 | 0.0 | |
| Burster incendiary field M4 | K010 | 0 | 64 | n/a | |
| Canister mine practice volcano | K042 | 10 | 0 | 0.0 | |
| Fuze mine combination M605 | K058 | 108 | 0 | 0.0 | |
| Mine anti-personnel M16A1 with fuze | K092 | 18 | 0 | 0.0 | |
| Mine anti-personnel directional M1 (claymore) | K143 | 195 | 18 | 9.2 | |
| Mine anti-tank high explosive M15 with fuze | K180 | 18 | 0 | 0.0 | |
| Mine anti-tank M21 with fuze M607 | K181 | 18 | 0 | 0.0 | |
| Mine AT high explosive M19 with fuze | K250 | 18 | 0 | 0.0 | |
| Riot control Agent, CS (Tear) capsule | K765 | 2,650 | 883 | 33.3 | |
| Smoke pot M5, HC | K866 | 0 | 0 | 0.0 | Uses HC, will be phased out of use by FY 99 and replaced by the K868 which uses terephthalic acid |
| Smoke pot M8, TPA [3] | K868 | 110 | 840 | 763.6 | Replacement for the K866 which used HC |
| Thickening Compound - (quantity of 40 ounce cans used) | K917 | 111 | 354 | 318.9 | |
| Signal illumination green star parachute M1 | L305 | 19 | 0 | 0.0 | |
| Signal illumination red star cluster | L306 | 46 | 60 | 130.4 | |
| Signal illumination white star cluster | L307 | 344 | 357 | 103.8 | |
| Signal illumination red star parachute | L311 | 44 | 260 | 590.9 | |
| Signal illumination white star parachute | L312 | 3,918 | 1,204 | 30.7 | |
| Signal illumination green star | L314 | 119 | 207 | 174.0 | |

**Table 5.13:**
**Ammunition Requirements for the RCP and OPTM (Army's Proposed Action) Alternative [1]**

| Type of Ammunition or Explosive | Army Class | Quantity Currently Used at FLW [2] | Additional BRAC requirements [2] | Percent Increase | Remarks |
|---|---|---|---|---|---|
| ATWESS (MILES) | L367 | 27 | 0 | 0.0 | laser for TOW and Dragon weapons systems simulators |
| Flare surface trip | L495 | 433 | 436 | 100.7 | |
| Illumination projectile ground burst | L594 | 3,360 | 2,844 | 84.6 | |
| Simulated projectile air burst | L595 | 0 | 26 | n/a | |
| Simulated booby trap | L598 | 1,428 | 124 | 8.7 | |
| Simulated booby trap, illuminated | L599 | 518 | 146 | 28.2 | |
| Simulated booby trap, whistle | L600 | 319 | 1,190 | 373.0 | |
| Simulated hand grenade | L601 | 2,304 | 1,079 | 46.8 | |
| Charge demolition C4, 1¼ pound | M023 | 12,361 | 353 | 2.9 | |
| Charge demolition block (four ½ pound sheet) | M024 | 18 | 0 | 0.0 | |
| Demolition kit banglore torpedo | M028 | 64 | 0 | 0.0 | |
| Charge demolition TNT ¼ pound | M030 | 18,877 | 1,805 | 9.6 | |
| Charge demolition TNT 1 pound | M032 | 0 | 72 | n/a | |
| Charge demolition 40 pound | M039 | 327 | 0 | 0.0 | |
| Cap blasting electric M6 | M130 | 10,272 | 1,445 | 14.1 | |
| Cap blasting non-electric M7 | M131 | 13,383 | 657 | 4.9 | |
| Cartage, Impulse | M174 | 34 | 0 | 0.0 | |
| Coupling base | M327 | 225 | 0 | 0.0 | |
| Charge demolition shaped | M420 | 273 | 0 | 0.0 | |
| Charge demolition shaped | M421 | 239 | 0 | 0.0 | |
| Cord detonation reinforced (quantity of linear feet used) | M456 | 470,206 | 63,800 | 13.6 | |
| Dynamite military | M591 | 11,895 | 0 | 0.0 | |
| Firing device demolition pressure release | M627 | 68 | 0 | 0.0 | |
| Fuze time blasting (quantity of 25-foot long sections used) | M670 | 89,364 | 6,812 | 7.6 | |
| Charge assembly demolition | M757 | 113 | 0 | 0.0 | |
| Igniter fuze blast time | M766 | 12,049 | 657 | 5.5 | |
| Firing device multipurpose | ML03 | 132 | 0 | 0.0 | |
| Light Sticks, number of boxes with 25 per box | | 24 | 12 | 50.0 | |

Note:
1 Quantities are expressed in the number of each item (unless noted as lineal feet or gallons).
2 All quantities are approximate, and annual usage will vary based on the number of students trained and unit training programs. Quantities include usage by active US Army Forces Command and US Army Training and Doctrine Command units.
3 Terephthalic acid replacement for the item in the row above which uses HC. HC items will be phased out of use by FY 99 and replaced by the items which use terephthalic acid.

*Source: Harland Bartholomew & Associates, Inc.*

As discussed in TG 10.1, Weapons Training, the RCP and OPTM (Army's Proposed Action) Alternatives will involve the use of approximately 6 high-explosive and 24 modified training Mark 19 rounds by each Army student and 24 high-explosive Mark 19 rounds by each Marine

Corps student. Implementation of this alternative will result in the use of approximately 4,004 additional high-explosive rounds (Army Class B571) and approximately 118,216 additional modified training rounds (Army Class B584) used for Mark 19 training each year. Mark 19 training by students at the Military Police School, as currently planned, will only occur during the day (7:00 a.m. to 10:00 p.m.). In addition, this training will include the use of the other ammunition and explosives listed on Table 5.13.

- **Indirect Impacts.** The use of the standard, high-explosive Mark 19 rounds will generate more noise than the modified training rounds which would be used if the EPTM Alternative is implemented. Consequently, the RCP and OPTM (Army's Proposed Action) Alternatives will result in more noise associated with the impact and explosion of rounds than the EPTM Alternative. The impact of this noise on other on-post and off-post activities is dependent upon the location selected to perform this training. Based upon an analysis of the additional munitions requirements and their experience the U.S. Army Center for Health Promotion and Preventive Medicine determined that the high explosive rounds used for Mark 19 training had the greatest potential for impacting surrounding land uses.

  If the Army's Proposed LU & FP (CH&I) is implemented the residences in Palace will be approximately 2 miles (3.2 kilometers) south of the Range 19 target area. The calculated C-weighted SEL from a single explosion of high explosive 40 mm rounds used for Mark 19 training would be approximately 76 dB at approximately 1.8 miles (3 km). To find the cumulative noise impact from all of the explosions, one must average the total energy from all of the explosions in a year and average over a one year period. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM, 1996) calculated that the noise level at approximately 1.8 miles (3 km) would be only 37 dB, which is 25 decibels below the criterion for a Zone 2 noise area, as discussed in subsection 4.4.

  Therefore, the implementation of the additional range training, including the Mark 19 training, as part of the Army's Proposed Action at the range locations specified in the Army's Proposed LU & FP (CH&I) will result in slight increases in the amount of noise impacts experienced in the surrounding community. These additional impacts are not anticipated to significantly degrade the existing noise environment of the people occupying the closest sensitive land uses.

**5.2.2.4.1.2 EPTM Alternative.** This alternative will result in impacts that are similar to those anticipated from the RCP and OPTM (Army's Proposed Action) Alternative for: 1) aircraft operations; 2) maintenance facilities; and 3) ordnance demolition. As discussed in Training Goal 10.1, the EPTM Alternative will involve the use of approximately 30 modified training Mark 19 rounds by each Army student and 24 modified training Mark 19 rounds by each Marine Corps student. This will result in a change in the level of impacts associated with the use of large and small caliber weapons firing ranges.

- **Direct Impacts.** Implementation of this alternative will result in the use of at total of approximately 122,620 modified training rounds (Army Class B584) annually for Mark 19 training and no increase in the number of high-explosive rounds currently used at FLW as shown on Table 5.14. In addition, this training will include the use of the other ammunition and explosives listed on Table 5.13.

**Table 5.14:**
**Ammunition Requirements EPTM Alternative [1]**

| Type of Ammunition or Explosive | Army Class | Quantity Currently Used at FLW [2] | Additional BRAC requirements [2] | Percent Increase | Remarks |
|---|---|---|---|---|---|
| **Ammunition** | | | | | |
| 40 mm High Explosive | B571 | 33,900 | 0 | 0.0 | used for Mark 19 |
| 40 mm Training Practice | B584 | 13,900 | 122,620 | 882.2 | used for Mark 19 |

Note: 1 Quantities are expressed in the number of each item.
2 All quantities are approximate, and annual usage will vary based on the number of students trained and unit training programs.

*Source: Harland Bartholomew & Associates, Inc.*

- **Indirect Impacts.** The use of only modified training rounds to support the training requirements of the Military Police School and Chemical School will reduce the level of noise associated with the impact and explosion of Mark 19 rounds. At 1.8 miles (3 km) the sound of firing modified training rounds (Army Class B584) will be inaudible (USACHPPM, 1996). Consequently, the implementation of the EPTM Alternative will reduce the amount of noise impact of this training on other on-post and off-post activities.

  Therefore, the implementation of the additional range training, including the Mark 19 training, as part of the EPTM at the range locations specified in the Army's Proposed LU & FP (CH&I) will result in slight increases in the amount of noise impacts experienced in the surrounding community. These additional impacts are not anticipated to significantly degrade the existing noise environment of the people occupying the closest sensitive land uses.

**5.2.2.4.2 Issue: *Mobile Source (Vehicular) Noise.*** Each of the training methods will generate similar increases in vehicle use and the resulting noise levels. Differences in how this noise will impact activities depends upon the location of the traffic. This land use plan will concentrate traffic, and consequently the noise associated with this additional traffic, near the Engineer Headquarters and numerous administrative activities.

- **Direct Impacts.** Increased traffic noise will occur near: the housing north of General Leonard Wood Army Community Hospital (GLWACH); residents at Morelli Heights; and occupants of the many administrative areas near the Engineer Headquarters. The impact will be minor since the majority of the traffic activity will coincide with routine work days.

**5.2.2.4.3 Issue: *Noise Impacts on Other Biological Resources.*** The discussion contained in issues one and two above (subsections 5.2.2.4.4.1 and 5.2.2.4.4.2) were based on the analysis of impacts on humans. Different animal species have different hearing ranges and are impacted by noise differently; consequently, discussion concerning the anticipated impacts of noise changes on other biological resources has been included in subsection 5.2.2.11.

## 5.2.2.5 Water Resources

This section examines the potential effects of implementing alternative training methods on water resources in the FLW area. As described in Section 3, there are three components of the proposed action. The following paragraphs focus on issues associated with implementation of training alternatives. The discussion has been divided into two parts: surface water and floodplain issues (subsection 5.2.2.5.A) and hydrogeology/groundwater (subsection 5.2.2.5.B). Only those training activities which have the potential to impact water resources are discussed.

## 5.2.2.5.A. Surface Water and Floodplains

The analysis of surface water and floodplain impacts associated with alternative training activities is presented in the context of the following issues:

- Deposition of fog oil obscurant;
- Accidental spill of fog oil;
- Maintenance training and operations;
- Runoff from training and maneuver areas;
- Release of unburned fuels from FFE deterrents training; and
- In-stream crossings or in-lake vehicle operations.

**5.2.2.5.A.1 Issue: *Deposition of Fog Oil Obscurant.*** The use of fog oil to create obscurant clouds may result in the deposition of fog oil on vegetation and the ground surface. Fog oil remaining on the vegetation and ground surface could enter installation waters through runoff during a rainfall event. Training for the following TGs includes the use of fog oil obscurant: TG 7.2 Obscurant Employment Operations (Static); TG 7.3 Obscurant Employment Operations (Mobile); and TG 7.4 Obscurant Employment Operations (Field).

Liljegren et al.(1988) and DeVaull et al. (1989) suggested that fog oil disperses upward and volatilizes, with little deposition. Liljegren could detect no fog oil on any of over 200 specially designed deposition samplers positioned within a 5,280 feet by 2,640 feet (1,600 by 800 meter) field trial area. The closest samplers were within 82.5 feet (25 meters) of fog oil generator and the detection limit was 1 µg/123 $cm^2$ (= 8.15 X $10^{-5}$ $g/m^2$).

Whereas evidence of fog oil deposition was not detected in field investigations, models can and have been developed to predict deposition from the obscurant cloud. Even though results of deposition models have yet to be validated, such modeling does provide a worst-case estimate of fog oil amounts that have the potential to deposit on surfaces. Deposition modeling predicted a range of deposition concentrations from 0.01 $g/m^2$ directly at the generators to 0.0001 $g/m^2$ at 30 miles (50 kilometers) downwind of the generator (COE KC, 1997b). The modeling assumed 20 generators operating simultaneously for 90 minutes during which the generators consumed 1,200 gallons (4,560 liters) of fog oil. However, typical training events generally last 30-45 minutes. Therefore, the amounts actually deposited would be even less than the very small amount predicted by the modeling. The results of field studies and modelling both indicate very small amounts of fog oil are likely to be deposited on surfaces.

Recent studies conducted on Range 24A at Fort McClellan, where obscurant training has been occurring for over 25 years, have revealed that no detectable concentrations of fog oil were found in soils, surface waters, sediment, or air (COE KC, 1995). This study indicates fog oil does not bioconcentrate or biomagnify in the environment. Further discussion of fog oil composition, deposition, dispersion, degradation and environmental effects may be found at 5.2.2.6.4 and 5.2.1.15.B.1.

Results of field studies and deposition modeling discussed above strongly suggest that concentrations of fog oil which may potentially reach surface waters through runoff would be extremely low. Therefore no direct significant adverse impacts from fog oil are anticipated. Potential concentrations of fog oil which may enter surface waters through stormwater drainage are expected to be very low and are not expected to create noticeable changes in water quality parameters. Since the quantity of fog oil depositing on a surface water body is extremely low, a surface sheen is unlikely to form. The potential impact of the deposition of fog oil on aquatic resources and soils are described further in subsections 5.2.2.11.D and 5.2.2.6, respectively.

Missouri state water quality standards include an antidegradation policy. This policy states, "Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses." (10 CSR 20-7, 1994). To prevent the discharge of harmful quantities of fog oil into

installation waters, drainage areas are monitored by NPDES Permit No. MO-0117251. This permit requires sampling/monitoring for total petroleum hydrocarbons (TPH), and Oil and Grease on a quarterly basis and outfalls shall be observed for the presence of oil sheen, or other unnatural colors whether a rainfall event has occurred or not. The current NPDES Permit No. MO-0117251, as specified on Table H.1 in Volume III, Appendix H of the EIS, specifies the location, frequency and types of items that will be monitored for in stormwater. Fort Leonard Wood will coordinate, collect and share this monitoring information, along with the information obtained as a result of the bio-monitoring plan (as discussed in subsection 5.1.4.3) with the State of Missouri, Department of Natural Resources. Changes in the types of materials being sampled, the locations of samples, and the frequency of samples will be made as required to demonstrate compliance with applicable Federal, state and local water quality regulations.

Obscurant training under the Army's Proposed LU & FP (CH&I) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Cannon Range (Mush Paddle Hollow), Musgrave Hollow, McCann/Bailey Hollow and Ballard Hollow. These drainage areas are all tributaries of Roubidoux Creek.

Adverse impacts are not anticipated to occur to surface waters under the RCP, OPTM (Army's Proposed Action) or EPTM Alternative. Based upon the discussion in 5.2.2.6.4, 5.2.2.11.B.4, 5.2.2.11.D.1 and 5.2.2.15.B.1, and above under this issue, the probability of adverse impacts to surface water quality are considered very low. Since fog oil deposition rates are very minute and since fog oil degrades rapidly through normal biological processes, potential runoff of fog oil into surface waters will be below levels likely to impact water quality.

**5.2.2.5.A.2 Issue: *Accidental Spill of Fog Oil.*** The storage and transportation of fog oil (in 55-gallon drums) provides a potential for fog oil spills. The spilled fog oil could enter surface waters through runoff associated with rainfall events or as a result of a major spill during the transportation of fog oil across a water source. If fog oil entered surface waters it could create a surface sheen. Training goals that present a potential for resulting in fog oil spills, include: TG 7.2 Obscurant Employment Operations (Static); TG 7.3 Obscurant Employment Operations (Mobile); TG 7.4 Obscurant Employment Operations (Field); and TG 7.6 Obscurant Storage Operations.

Unless a major spill event were to occur, concentrations of fog oil that would reach surface waters would be extremely low. Fort Leonard Wood has an established Installation Spill Prevention and Response Plan (Radian, 1994), which provides guidance for the safe and effective control, prevention, containment, cleanup, disposal, restoration and reporting of accidental spills or releases into the environment of oil, hazardous materials and hazardous wastes. Any accidental spills that occur would be handled in accordance with the requirements of these plans. The plans adequately address the procedures for cleanup should a spill occur. Therefore no significant direct adverse impact from a spill is anticipated. The potential impact of fog oil spills on aquatic resources and soils are described further in subsections 5.2.2.11.D and 5.2.2.6, respectively.

Obscurant training under the Army Proposed LU & FP (CH&I) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile - Cannon Range (Mush Paddle Hollow), Musgrave Hollow, McCann/Bailey Hollow and Ballard Hollow; Field - at mobile training locations. Obscurant storage under this plan would be conducted within Bailey and Ballard Hollow. As discussed in subsection 5.2.2.5.A.1, drainage areas are monitored by NPDES Permit No. MO-0117251 for the purpose of protecting the surface waters downstream of FLW.

#### 5.2.2.5.A.2.1 RCP Alternative

- **Indirect Impacts.** There is a minor potential for short-term indirect adverse impact to surface waters as a result of the accidental spill of fog oil. This potential exists as long as fog oil is stored, handled, transported or used in training at FLW. Obscurant storage operations would be conducted within two uncovered storage areas which will be provided to house the 55-gallon (209

liters) drums that are used to store and ship fog oil. The uncovered storage areas would include oil water separators and surface water collection systems to reduce the potential for any runoff that may contain fog oil from escaping the storage area.

Transportation of fog oil will be accomplished as required using various types of vehicles. The fog oil will be carried either in the 55-gallon (209 liters) storage drums or in the obscurant generators. The maximum amount of fog oil that might be inadvertently spilled would be limited by the maximum amount of fog oil used during any single training event. Based on analysis of training requirements, the Chemical Officer Basic Course uses a maximum of approximately 720 gallons (2,736 liters) per day during the Field Training Exercise (TG 7.3 Obscurant, Employment Operations Test (Field Training Exercise)). Transportation of this fog oil to the training area would involve the movement of approximately fourteen 55-gallon (209 liters) drums of fog oil. As stated above any fog oil that might be spilled during transportation would be contained and cleaned up in accordance with the Installation Spill Prevention and Response Plan (Radian, 1994).

Impacts from minor spills in the field are not expected due to spill recovery procedures that are in place (Radian, 1994) and due to the natural attenuation characteristics of fog oil.

**5.2.2.5.A.2.2 OPTM (Army's Preferred Action) Alternative.** Under this alternative, the potential for a long-term indirect adverse impact is reduced because less fog oil would be used during the year, and the design of the oil storage areas would be modified.

- **Indirect Impacts.** To reduce the potential of an accidental spill of fog oil, Obscurant Storage Operations would be conducted within decentralized covered storage areas. With storage operations conducted within covered storage areas the potential for fog oil spills that would result in fog oil entering surface waters through storm water runoff is reduced. The covered areas will help reduce rusting of drums, and will prevent rain, snow and ice accumulations from increasing the potential for drum rupture during handling operations. Consequently the potential for fog oil to enter surface waters, where it would have a short-term indirect adverse impact, is reduced.

  Transportation of fog oil between the storage areas and the training area results in the potential for fog oil spills. As in the RCP Alternative, fog oil will be stored in 55 gallon (209 liters) drums, and transported in the 55-gallon storage drums or in the obscurant generators. The maximum amount of fog oil that might be inadvertently spilled would be limited by the maximum amount of fog oil used during any single training event. Based on analysis of training requirements, the Chemical Officer Basic Course uses a maximum of approximately 720 gallons (2,736 liters) per day during the Field Training Exercise (TG 7.3 Obscurant, Employment Operations Test (Field Training Exercise)). Transportation of this fog oil to the training area would involve the movement of approximately fourteen 55-gallon drums of fog oil. As stated above any fog oil that might be spilled during transportation would be contained and cleaned up in accordance with the Installation Spill Prevention and Response Plan (Radian, 1994).

  Impacts from minor spills in the field are not expected due to spill recovery procedures that are in place (Radian, 1994) and due to the natural attenuation characteristics of fog oil.

**5.2.2.5.A.2.3 EPTM Alternative**

- **Indirect Impacts.** Under the EPTM Alternative, Obscurant Storage Operations would be conducted within a centralized covered storage area. Within a centralized covered storage area, the potential for spilled fog oil to enter surface waters through storm water runoff is reduced due to the protection of the roof and containment designs built into flooring. Therefore, the potential for short-term indirect adverse impacts are greatly reduced. Under this training method, the amount of fog oil used and the resulting impacts from mobile obscurant training would remain as discussed in subsection 5.2.2.5.A.2.2. The amount of fog oil used during static and field obscurant training would be reduced to 1,000 gallons (3,800 liters) per year and 28,500 gallons

(108,300 liters) per year, respectively. Since the amount of fog oil used during static obscurant training is greatly reduced, the potential for an accidental spill of fog oil to reach surface water is negligible and therefore, no adverse impacts are anticipated. During mobile and field obscurant training, the potential for the inadvertent spill of fog oil still exists, creating the potential for indirect adverse impacts.

Impacts from minor spills in the field are not expected due to spill recovery procedures that are in place (Radian, 1994) and due to the natural attenuation characteristics of fog oil.

**5.2.2.5.A.3 Issue: *Maintenance Training and Operations.*** Maintenance training associated with training goals TG 2.2 BIDS Maintenance; TG 3.2 FOX Maintenance; TG 7.5 Obscurant Maintenance; and TG 11.3 Vehicle Maintenance could result in the release of oils, greases, or fluids to the environment.

**5.2.2.5.A.3.1 RCP Alternative.** Training goals that require exterior maintenance include maintenance on the HMMWV and trailer in the parking area near the classroom for TG 2.2 BIDS Maintenance, performing TG 3.2 FOX Maintenance on the FOX equipment in a parking area where the classroom is located, performing maintenance on the fog oil generators in a parking area near the classroom where training occurs associated with TG 7.5 Obscurant General Maintenance, and performing maintenance on vehicles outside of a maintenance bay or in an area without surface water runoff controls during TG 11.3 Vehicle Maintenance. Since the maintenance activities in these uncontrolled environments would not be restricted to any designated area, the location of the training according to the land use alternative is not a factor.

- **Indirect Impacts.** Oils, greases or other fluids spilled during maintenance training could create a long-term indirect adverse impact to surface waters. If the area where the demonstration occurs is paved, then the spill could enter a storm water conveyance system. If the area used for training is not paved, then a spill might enter surface waters through runoff. A long-term indirect adverse impact could result if oils are not contained. The potential impact to ground water, soils and aquatic resources are described in subsections 5.2.2.5.B.5, 5.2.2.6 and 5.2.2.11.D, respectively.

**5.2.2.5.A.3.2 OPTM (Army's Proposed Action) and EPTM Alternatives**

- **Indirect Impacts.** The OPTM (Army's Proposed Action) and EPTM Alternatives provide maintenance training on vehicles and equipment at a site designed to control surface water runoff, oils and grease. Therefore, oils and grease are less likely to enter surface water. Operation would be in conformance with the current FLW NPDES permit. Therefore, no adverse impacts to surface waters are anticipated.

**5.2.2.5.A.4 Issue: *Runoff from Training and Maneuver Areas.*** Disturbance from wheeled and tracked vehicles during maneuver operations will result in soil displacement and subsequently lead to erosion and an increased sediment load in surface waters. Vehicles used during maneuver operations may contaminate runoff by the uncontrolled release of oils, grease or fluids. Soil erosion may also be increased through the use of high explosives which redistribute soils and damage vegetation. Training goals associated with this issue include: TG 1.2 Maneuver Operations; TG 1.8 Warfighting and Tactical Operations; TG 2.1 BIDS Employment and Operations; TG 3.1 FOX Employment and Operations; TG 6.2 NBC Equipment; TG 7.3 Obscurant Employment Operations, Mobile; TG 7.4 Obscurant Employment Operations, Field; and TG 10.1 Weapons Training.

#### 5.2.2.5.A.4.1 RCP Alternative

- **Indirect Impacts.** Training goals that require the movement of personnel, vehicles and equipment (TG 1.2, Maneuver Operations; TG 1.8, Warfighting and Tactical Operations; TG 2.1, BIDS Battlefield Employment and Operation; TG 3.1, FOX Battlefield Employment and Operations; TG 11.1 Vehicle Operations, Driver Qualification) on available training areas may result in long-term indirect adverse impacts to surface waters. An increase in sediment runoff would result from damage to vegetation and soils. The potential impact of sediment load on aquatic resources and soils are described further in subsections 5.2.2.11.D and 5.2.2.6, respectively.

  Training activities during TG 6.2, NBC Equipment involve the decontamination of vehicles and equipment. This decontamination process could result in the runoff of training simulants, sediment, oils, grease or fluids into surface waters. Under the Army's Proposed LU & FP (CH&I), decontamination training would occur at the following sites: pond north of Babb Airfield; Penn's Pond (north); Penn's Pond (south); pond south of TA 243; pond at TA 238; and pond in McCann Hollow. A long-term indirect adverse impact could result if the runoff is not contained.

  Mobile and Field Obscurant Employment Operations (TG 7.3 and TG 7.4) under the Army's Proposed LU & FP (CH&I) would be conducted within the following drainage areas: Cannon Range (Mush Paddle Hollow), Musgrave Hollow, McCann/Bailey Hollow and Ballard Hollow. Field maneuver operations within these drainage areas would damage vegetation and soils; thus, increasing the sediment load within surface waters. A long-term indirect adverse impact could result if the sediment load is not reduced.

  The use of live fire and high explosives during TG 10.1 Weapons Training could result in the redistribution of soil and the destruction of vegetation; thus, increasing the sediment load within the surface water system. Increasing the sediment load within the surface water system could result in a long-term indirect adverse impact.

#### 5.2.2.5.A.4.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts.** Training goals 1.2, 1.8, 2.1, 3.1, 6.2 and 11.1 would remain as discussed in subsection 5.2.2.5.A.4.1; therefore, a long-term indirect adverse impact to surface water is anticipated.

  During obscurant operations (mobile TG 7.3 and field TG 7.4) the difference between the RCP Alternative discussed in subsection 5.2.2.5.A.4.1 and the OPTM (Army's Proposed Action) and EPTM Alternatives is the quantity of fog oil being used. Since the quantity of fog oil used during training does not affect the increase in sediment load, long-term indirect adverse impacts would remain as noted in subsection 5.2.2.5.A.4.1.

  Training activities within the OPTM (Army's Proposed Action) and EPTM Alternatives would continue to include the use of high explosive rounds during TG 10.1 Weapons Training. As a result, a long-term indirect adverse impact resulting from an increase in sediment load is anticipated.

**5.2.2.5.A.5 Issue: *Release of Unburned Fuels from FFE Deterrent Training.*** Flame field expedient deterrents demonstrations using fuel ignited in containers or on the ground as performed during TG 1.3 Mines and Obstacles Designed to Prevent Movement will result in the release of unburned fuel into the environment. The unburned fuel may runoff and enter the installation's surface water system and degrade water quality. The potential impact to ground water and aquatic resources is discussed within subsections 5.2.2.5.B.2 and 5.2.2.11.D.5, respectively. Alternative training locations for FFE deterrents training are illustrated on Figure 5.2. The Army's Proposed LU & FP (CH&I) for TG 1.3 Mine

and Obstacles Designed to Prevent Movement is located at Range 27A (McCann Hollow). Streams in McCann Hollow flow seasonally and may transport unburned fuel off the site.

**5.2.2.5.A.5.1 RCP Alternative.** Unburned fuel is released into the environment during FFE deterrent training activities when it is dispersed by the FFE deterrents that are exploded. Under the RCP Alternative approximately 900 gallons (3,420 liters) of thickened fuel will be used in each of 41 training cycles per year. It is estimated that the FFE deterrents are approximately 89.5 percent effective in burning the fuel (FLW, 1996b), meaning that approximately 105 gallons (399 liters) of unburned fuel would remain after each training cycle. Of this amount approximately 33 percent (FLW, 1996b) or approximately 35 gallons (133 liters) will evaporate and 67 percent (FLW, 1996b) or approximately 70 gallons (266 liters) will remain on the soil unevaporated. Consequently a total of approximately 2,870 gallons (10,906 liters) of unevaporated, unburned fuel will impact the soil each year, although this total quantity will be reduced through natural degradation.

- **Direct Impacts.** The repeated released of unburned fuel into the environment at the training site has the potential to cause long-term indirect adverse impact to surface waters in a seasonal creek that runs proximate to the northern edge of the FFE deterrent training area.

- **Indirect Impacts.** The repeated released of unburned fuel into the environment at the training site has the potential to cause long-term indirect adverse impact to surface waters.

**5.2.2.5.A.5.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** Under the OPTM (Army's Proposed Action) and EPTM Alternatives, the amount of thickened fuel used during FFE deterrents training exercises will be reduced from approximately 900 gallons (3,420 liters) per training event as specified in the RCP Alternative to approximately 550 gallons (2,090 liters) per training event. This training will also be accomplished in each of 41 training cycles per year. Based on the reduced usage to 550 gallons per event and a burning rate of approximately 89.5 percent approximately 65 gallons (247 liters) of unburned thickened fuel would remain unburned after each training cycle. Of this amount approximately 33 percent (FLW, 1996b) or approximately 22 gallons (84 liters) will evaporate and 67 percent (FLW, 1996b) or approximately 45 gallons (171 liters) will remain on the soil unevaporated. Consequently a total of approximately 1,845 gallons (7,011 liters) of unevaporated, unburned fuel will impact the soil each year, although this total quantity will be reduced through natural degradation. The OPTM (Army's Proposed Action) and EPTM Alternatives also include:

- augmenting the field training with professionally-developed video tapes that would illustrate the magnitude and physical characteristics of the explosions;
- the design and construction of a protective barrier under the expedient wall-of-flame training area to reduce the potential for unburned fuel to contaminate surface or groundwater;
- the construction of earthen berms around the total flame training site to prevent upstream surface water from running across the training area; and
- the installation of clay-lined collection ponds to gather and hold runoff that occurs within the bermed flame training area.

Unburned fuels are prevented from entering ground water and surface water through the use of an impervious liner under the flame training areas, berms around the training area to minimize surface water flows across the training site, and sedimentation ponds that will be designed to catch surface water runoff that flows from lands within the flame training area boundaries. The FFE Range liner will be a geosynthetic clay liner. The liner will consist of a sodium montmorillonite clay (bentonite) layer evenly distributed between two geotextiles or attached to a polyethylene geomembrane. The geosynthetic clay liner shall inhibit migration of the clay in its dry or hydrated state. Any accidental spills within the controlled flame range training area would be cleaned up and the materials handled in accordance with the Installation Spill Prevention and Response Plan (Radian, 1994).

- **Indirect Impacts.** Compared to the RCP Alternative, described in subsections 5.2.2.5.A.5.1, the reduced quantity of fuel being used would decrease the estimated amount of fuel left unburned to

1,845 gallons per year. The containment system would also reduce the amount of fuel entering the surface water system. Complete capture and control of the unburned fuel would be unlikely. A long-term indirect adverse impact may still occur; however, this potential impact would be substantially reduced when compared to the RCP Alternative. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60, located in subsection 5.5.5.

**5.2.2.5.A.6 Issue: *In-Stream Crossings or In-Lake Vehicle Operations.*** The operation of vehicles in-stream crossings or in-lake operations may redistribute sediment and destroy stream banks causing an increase in suspended solids, and wash off vehicle contaminants such as oils, grease or fluids directly into a surface water body. In-stream or in-lake vehicle operations may occur during: TG 1.2 Maneuver Operations; TG 2.1 BIDS Employment and Operation; TG 3.1 FOX Battlefield Employment; TG 7.3 Obscurant Employment Operations, Mobile; and TG 7.4 Obscurant Employment Operations, Field. These operations include both crossing through existing streams and creeks on the installation during vehicle operations, and amphibious training of the FOX vehicle.

This increase in sediment load may affect the aquatic resources within the stream or lake. A discussion of the impacts to aquatic resources is included in subsection 5.2.2.11.D. As discussed in subsection 5.1.4.2 above FLW will implement management controls on training in order to avoid many of the impacts associated with in-stream vehicle crossings, FLW will require that:

- all initial HMMWV stream crossing training be limited to a specifically designed training area with an obstacle designed to replicate a stream crossing; and
- that all in-stream crossings as part of other maneuver operations, and mobile and field obscurant training be limited to areas which have been improved to limit the impacts associated with crossings.

Consequently, the only training goal that would require amphibious operation of a vehicle (at other than an improved stream cross) would be instruction on the operation of the FOX vehicle in an amphibious environment.

**5.2.2.5.A.6.1 RCP Alternative**

- **Direct Impacts.** Under the Army's Proposed LU & FP (CH&I), field maneuver operations associated with TG 1.2, TG 2.1 and TG 3.1 would be conducted within an available training range. Such operations may require vehicles to cross a stream or lake, however as stated above these crossing would be limited to improved areas specifically designed to limit the impacts associated with vehicle crossings. During these crossings very small amounts of sediment may redistribute, thereby increasing the suspended solids in the stream or lake. Contaminants may be contained within the sediment as a result of oils, grease, or fluids washing off the vehicles directly into the surface water body. A long-term direct adverse impact is anticipated within the stream or lake crossed during training.

  In-lake maneuver operations associated with TG 3.1 Fox Battlefield Employment under the Army's Proposed LU & FP (CH&I) would also be conducted within TA 250. These maneuver operations would be conducted within a surface water body previously designed and constructed for the use of vehicle in-lake operations; therefore, no adverse impacts are anticipated.

  Field maneuver operations associated with Obscurant Employment Operations (Mobile and Field) would be conducted within the following drainage areas under the Army's Proposed LU & FP (CH&I): McCann/Bailey Hollow, Cannon Range (Mush Paddle Hollow), Musgrave Hollow and Ballard Hollow. During training, vehicles would be allowed to travel cross-country but allowed to cross streams only at improved areas. Nevertheless, contaminants may be contained within the sediment as a result of oils, grease, or fluids washing off directly into the surface water body. A long-term direct adverse impact is anticipated within the stream or lake crossed during training.

#### 5.2.2.5.A.6.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Direct Impacts.** Under this alternative impacts from field maneuver operations associated with TG 1.2, TG 2.1 and TG 3.1 under the OPTM (Army's Proposed Action) and EPTM Alternatives would remain the same as the RCP Alternative discussed in subsection 5.2.2.5.A.6.1.

  During obscurant operations (TG 7.3 mobile and TG 7.4 field) the difference between the RCP Alternative discussed in subsection 5.2.2.5.A.6.1 and the OPTM (Army's Proposed Action) and EPTM Alternative is the quantity of fog oil being used. Since the quantity of fog oil used during training does not affect whether or not a stream is crossed, long-term direct adverse impacts would still occur.

## 5.2.2.5.B Hydrogeology/Ground Water

Implementation of the planned training goals of the Military Police School and Chemical School at FLW will result in the following issues with respect to ground water:

- Soil erosion on training and maneuver areas;
- Release of unburned fuels from FFE deterrent training;
- Seismic activity;
- Deposition of fog oil obscurant; and
- Maintenance training and operations.

**5.2.2.5.B.1 Issue: *Soil Erosion on Training and Maneuver Areas.*** Disturbance from wheeled and track vehicles during maneuver operations, and weapons training on live-fire weapons ranges will result in increased soil erosion. The direct impacts of the soil erosion are discussed in subsection 5.2.2.6.1. The off-road training components associated with these activities will be conducted at existing FLW facilities. These training objectives will use simulators to reduce the amount of off-road training that will be conducted. The simulators being constructed for the relocated mission will also be used for the existing FLW training missions.

**5.2.2.5.B.1.1 RCP Alternative.** A minimal indirect long-term impact to ground water will occur due to off-road vehicle operations on training and maneuver areas. The direct impact of this traffic will be an increase in erosion and sedimentation in the impacted training areas, described in subsection 5.2.2.6.1. Surface water with an increased sediment load could run into area sinkholes, causing either plugging of the sinkholes or increases in turbidity of the ground water. The location of most maneuver areas in the southern portion of the installation, where sinkholes are less common, reduces the potential for adverse impacts to occur. The formation of a sinkhole in a sedimentation basin has lead to temporary increases in turbidity at Shanghai Spring in the past. Sedimentation at the swallow point of sinkholes is common under natural conditions. Therefore, the potential for an adverse impact would be very slight.

**5.2.2.5.B.1.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** A minimal indirect long-term impact to ground water will occur due to off-road vehicle operations on training and maneuver areas. The direct impact of this traffic will be an increase in erosion and sedimentation in the impacted training areas described in subsection 5.2.2.6.1. Surface water with an increased sediment load could run into area sinkholes, causing either plugging of the sinkholes or increases in turbidity of the ground water. The location of most maneuver areas in the southern portion of the installation, where sinkholes are less common, also reduces the potential for adverse impacts to occur. The formation of a sinkhole in a sedimentation basin has lead to temporary increases in turbidity at Shanghai Spring in the past. Sedimentation at the swallow point of sinkholes is common under natural conditions. Therefore the potential for an adverse impact would be very slight. The OPTM (Army's Proposed Action) and EPTM Alternatives includes the construction of basins to control sedimentation from the mobile smoke ranges at the Bailey/McCann Hollow and Ballard Hollow training sites. Construction of sedimentation basins will

mitigate the impact of sedimentation on surface water, which will further reduce the already slight impact on ground water.

**5.2.2.5.B.2 Issue: *Release of Unburned Fuels from FFE Deterrent Training.*** Flame field expedient deterrent training activities are discussed in subsection 5.2.2.5.A.5.1 above. Under the Army Proposed LU & FP (CH&I) this training will be conducted at Range 27A identified on Figure 5.2. This location is in the southern portion of the installation, where sinkholes are less common. Sinkholes were not identified in the vicinity of the training (see Figure 4.7).

**5.2.2.5.B.2.1 RCP Alternative.** As discussed in subsection 5.2.2.5.A.5.1 above, FFE deterrent training will use approximately 900 gallons (3,420 liters) of thickened fuel for each of 41 training cycles per year and will result in the release of approximately 2,870 gallons (10,906 liters) of unburned fuel per year.

- **Indirect Impact** This training will have an indirect, long-term significant adverse impact on ground water. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60, located in subsection 5.5.5. Flame field expedient deterrents training would result in unburned fuel being scattered over the soil surface. Wall-of-flame training would result in fuel seeping into the soil. These direct impacts are discussed in subsection 5.2.2.6.2. Fuel components in the soil will dissolve into water infiltrating through the soil, resulting in contamination of ground water. Concentrations of fuel components in the water infiltrating in the immediate area of the training would likely be above the Missouri Department of Natural Resources action levels for releases from underground storage tanks (MDNR UST Closure Guidance Manual). The impact to ground water could be mitigated by sorption to the matrix of the unconsolidated material and natural microbial degradation. The degree to which the fuel components would be attenuated would be dependent upon the rate of flow of water as it migrates downward and the concentration of dissolved oxygen and other nutrients needed by the microbes to allow them to metabolize the fuel components. Little attenuation of the contaminants would occur once the water reaches the bedrock due to the rapid ground-water flow associated with the solution-channel flow.

  Ground-water quality would be significantly adversely impacted in the immediate vicinity of the site. Range 27A is located in an area that could have flow to either Miller Spring or to other discharge locations within the Roubidoux or Big Piney basins. The recharge area for either Roubidoux Creek or Miller Spring is many times larger than the area that will be impacted by FFE deterrents training. It is very unlikely that any measurable impact from FFE deterrents training will be detectable at the ground-water discharge points.

**5.2.2.5.B.2.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM Alternatives would result in smaller impacts than those associated with the RCP Alternative. The degree of the impacts would be lessened as a result of the smaller amount of fuel used (550 gallons (2,090 liters) per training cycle vs 900 gallons (3,420 liters) for the RCP Alternative). As discussed in subsection 5.2.2.5.A.5.2 above, FFE deterrents training will use approximately 550 gallons of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 1,845 gallons (7,011 liters) of unburned fuel on the soil per year. In addition, modifications to the training area would be designed and constructed to collect unburned fuel and surface water runoff.

- **Indirect Impact** Impacts from these alternatives would be less severe due to the use of half the fuel and the potential to prevent losses from the wall-of-flame. Microbial degradation would have a relatively greater opportunity to degrade the unburned fuel in the soil under this alternative compared to the RCP Alternative due to the smaller quantities of unburned fuel. Therefore the impact to ground water would be reduced. However, these alternatives would continue to produce an indirect, long term significant adverse impact to ground water because of the potential for unburned fuel to enter the groundwater system.

**5.2.2.5.B.3 Issue: *Seismic Activity.*** Seismic activity from the New Madrid fault zone could cause a strong shock that could produce a Modified Mercalli intensity of VII at the CDTF. This shock would typically be expected to cause slight to moderate damage in well built ordinary buildings.

Under each of the training method alternatives (RCP, OPTM (Army's Proposed Action) and EPTM Alternatives) a new CDTF would be constructed. Operations in the CDTF would include storage and use of toxic chemical agents and their components in a controlled environment. The CDTF will be designed and constructed to withstand the maximum probable acceleration from a seismic event on the New Madrid fault zone without compromising the integrity of the containment structures. Containment structures that will be built into the CDTF include a double slab floor in areas were toxic agents and their component will be stored and used. A monitored collection system will be located beneath the containment areas to allow installation of a redundant monitoring system and for detection of any possible releases from the containment. Walls and doorways in the containment areas will be designed to hold any water used for fighting fires or other releases. With these safeguards in place, the potential for a release to reach ground water is negligible.

**5.2.2.5.B.4 Issue: *Deposition of Fog Oil Obscurant.*** Fog oil use during Obscurant Employment Operations (TG 7.2, Static, TG 7.3 Mobile and TG 7.4 Field Training) may deposit on soil which could then leach into ground water. Obscurant training under the Army's Proposed LU & FP (CH&I) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Cannon Range (Mush Paddle Hollow), Musgrave Hollow, McCann/Bailey Hollow and Ballard Hollow.

If fog oil were to accumulate in the soil, it could dissolve into water moving through the soil. Since there is little deposition regardless of the training method implemented (as discussed in subsection 5.2.2.5.A.1.1 above, and subsections 5.2.2.6.4 and 5.2.2.15.B.1.1 below), any deposits would be extremely low in quantity and would be degraded rapidly through normal biological processes; consequently there are no anticipated impacts on groundwater resources from this activity.

**5.2.2.5.B.5 Issue: *Maintenance Training and Operations.*** Training actions that include exterior maintenance include: TG 2.2 BIDS Maintenance; TG 3.2 FOX Vehicle Maintenance, TG 7.5 Obscurant Generator Maintenance, and TG 11.3 Vehicles Maintenance which could result in the release of oils, greases, or fluids to the environment.

**5.2.2.5.B.5.1 RCP Alternative.** As discussed in subsection 5.2.2.5.A.3.1, maintenance activities in these TGs would be performed in areas that are designed to restrict surface water runoff and in areas with uncontrolled surface water runoff.

- **Indirect Impacts.** Oils, greases or other fluids could be spilled during maintenance. If the area where the demonstration occurs is paved, then the spill could enter a storm water conveyance system or run off to sinkholes. If the area used for training is not paved, then a spill might impact soils. The area involved would be very small in comparison to the total area of recharge. Therefore the potential for impact to ground water on any but the smallest of scales is very low. The potential impact to soil is described in subsection 5.2.2.6 and the impact to aquatic resources is described in subsection 5.2.2.11.

**5.2.2.5.B.5.2 OPTM (Army's Proposed Action) and EPTM Alternative.** These alternatives specify that maintenance training on vehicles and equipment will be conducted at a sites designed to control surface water runoff. As a result there would be no impact to ground water.

## 5.2.2.6 Geology and Soils

The following issues related to geology and soils have been identified with the implementation of the planned BRAC training objectives at FLW:

- Soil erosion on training and maneuver areas;
- Release of unburned fuels during FFE deterrents training;
- Seismic activity;
- Deposition of fog oil obscurant; and
- Maintenance training and operations.

**5.2.2.6.1 Issue: *Soil Erosion on Training and Maneuver Areas.*** Disturbance from wheeled and tracked vehicles during maneuver operations will result in damage to soil structure and subsequently lead to soil erosion. The traffic will locally loosen the soil, raising the susceptibility of the soil to erosion. Rutting of the soil will concentrate water that would normally run off as sheet flow into concentrated channels, leading to the formation of rills and gullies. Soil erosion may also be increased through the use of high explosives which displace and redistribute soils. Both the vehicular traffic and the high explosives will damage existing vegetation. The damage to vegetation will occur due to physical impact with the vehicles, reduced soil fertility, and reduced oxygen exchange with the roots due to soil compaction. Without the vegetation in place to stabilize the soil, erosion rates will increase. The following training goals may affect sediment erosion from training and maneuver areas: TG 1.2 Maneuver Operations; TG 1.8 Warfighting and Tactical Operations; TG 2.1 BIDS Employment and Operations; TG 3.1 FOX Employment and Operations; TG 6.2 NBC Equipment; TG 7.3 Obscurant Employment Operations, Mobile; TG 7.4 Obscurant Employment Operations, Field; TG 10.1 Weapons Training; and Weapons Training, Pistol.

The anticipated impact of implementing each of the three training method (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives for this issue is similar. The off-road training components associated with these activities will be conducted at existing FLW facilities. These training goals will also employ the use of simulators to reduce the amount of off-road training that will be conducted. The simulators being constructed for the relocated mission will also be used for the existing FLW training missions. Weapons training will damage vegetative cover on the training ranges, increasing the potential for soil erosion.

- **Direct Impacts.** A direct long-term adverse impact to soil will occur due to off-road vehicle operations on training and maneuver areas, and weapons training on live-fire weapons ranges. Additional off-road traffic associated with the above listed training operations will result in rutting of the soil. The traffic and training activities will cause damage to vegetation, increasing the erosion potential. Many of the soils at FLW are susceptible to erosion without the impact of the off-road traffic. The direct impact of this traffic will be an increase in erosion and sedimentation in the impacted training areas.

- **Indirect Impacts.** The increased soil erosion resulting from the training operations will result in long term indirect impacts to surface water quality, ground-water quality and potential impacts to biological species, which are described in further in subsections 5.2.2.5 and 5.2.2.11.

**5.2.2.6.2 Issue: *Release of Unburned Fuels from FFE Deterrents Training.*** Implementation of FFE deterrents demonstrations using fuel ignited in canisters or on the ground as performed as a part of TG 1.3 Mine and Obstacles Designed to Prevent Movement will result in the release of unburned fuel into the environment. Over time, the accumulation of unburned fuel on the ground, even in small infrequent quantities, will act as an uncontrolled release. Environmental monitoring and cleanup may ultimately be necessary. Under the Army's Proposed LU & FP (CH&I), this training will be conducted at Range 27A (as illustrated on Figure 5.2).

**5.2.2.6.2.1 RCP Alternative.** As discussed in subsection 5.2.2.5.A.5.1 above, FFE deterrents training will use approximately 900 gallons (3,420 liters) of thickened fuel would be used in each of 41 training cycles per year and will result in the release of approximately 2,870 gallons (10,906 liters) of unburned fuel per year.

- **Direct Impacts.** Expedient flame field deterrents training would result in unburned fuel being scattered over the soil surface. Wall-of-flame training would result in fuel seeping into the soil. The unburned fuel would be released over an area of approximately 6 acres (2.4 hectares). The degradation of fuel components in soil by naturally occurring bacteria is well documented (Wiedemeier, 1994). Although naturally occurring soil bacteria could degrade some of the unburned fuel, it is unlikely that all of the fuel could be degraded, especially in the vicinity of the wall-of-flame training, where the highest concentrations would be expected. If the bacteria can not degrade the unburned fuel at the rate at which additional training introduces it to the soil, concentrations in the soil, and the extent of the impact will increase through time. It is likely that aerobic microbial degradation will be eventually limited by the concentration of oxygen in the soil. The impact of the explosions would cause physical damage to the soil. The physical damage, combined with the reduced vegetative cover, could result in increased rates of soil erosion.

**5.2.2.6.2.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM Alternatives would result in smaller impacts than those associated with the RCP Alternative. The degree of the impacts would be lessened as a result of the smaller amount of fuel used (550 gallons (2,090 liters) per training cycle vs 900 gallons (3,420 liters) for the RCP Alternative). As discussed in subsection 5.2.2.5.A.5.2 above, FFE deterrents training will use approximately 550 gallons of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 1,845 gallons (7,011 liters) of unburned fuel on the soil per year. In addition, modifications to the Wall-of-Flame training would be designed and constructed to collect unburned fuel. Most of the unburned fuel released under this alternative would be dispersed over an area of approximately 6 acres (2.4 hectares). The area of impact from FFE deterrents training would be smaller for this alternative compared to the RCP Alternative. The effect of physical impact to the soil would result in increased soil erosion compared to the baseline conditions. The amount of this increase would be somewhat less than the RCP Alternative. Microbial degradation would have a relatively greater opportunity to degrade the unburned fuel under this alternative compared to the RCP Alternative due to the less concentrated releases of unburned fuel as a part of the Wall-of-Flame training. Training under these alternatives would result in a long-term significant adverse direct impact to soil. Potential mitigation measures would be the same as identified for the RCP Alternative. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60, located in subsection 5.5.5.

**5.2.2.6.3 Issue: *Seismic Activity.*** Seismic activity from the New Madrid fault zone could cause a strong shock that could produce a Modified Mercalli intensity of VII at the CDTF. The existing CDTF at FMC is located in same seismic zone at FLW. This shock would typically be expected to cause slight to moderate damage in well built ordinary buildings.

Implementation of any of the three training method (RCP, OPTM (Army's Proposed Action) and EPTM) Alternatives will result in the construction of a new CDTF. Operations in the CDTF would include storage and use of toxic chemical agents and their components in a controlled environment. The CDTF structure will be designed to withstand the shock of a maximum credible earthquake without compromising the containment structures. Additionally, toxic agents will be stored in a double locked vault, further protecting them from damage. The potential for direct impact to soil as a result of damage from an earthquake is extremely remote.

Implementation of any of the three training method (RCP, OPTM (Army's Proposed Action) and EPTM) Alternatives will also result in the construction of a radiation lab as part of the General Instruction Facility (Project 46090). This lab would include storage and training locations of nuclear materials. The facility will be constructed to withstand the shock of a maximum credible earthquake. The potential for a release into soils is extremely remote.

**5.2.2.6.4 Issue: *Deposition of Fog Oil Obscurant.*** The employment of fog oil during Obscurant Employment Operations (TG 7.2 Static, TG 7.3 Mobile and TG 7.4 Field Training) may deposit on soil which could then leach into ground water. Obscurant training under the Army's Proposed LU & FP

(CH&I) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Cannon Range (Mush Paddle Hollow), Musgrave Hollow, McCann/Bailey Hollow and Ballard Hollow.

Analysis of soil samples collected from an Army smoke obscurant training area at Hoehenfels, Germany indicated that no hydrocarbons could be detected at a hydrocarbon detection limit of 5 to 11 parts per million (Brubaker, 1992). Studies on Range 24A at FMC, where obscurant smoke training has been occurring for over 25 years, have also revealed that no detectable concentrations of hydrocarbons attributable to fog oil were found in soils, surface waters, sediment, or air (COE KC, 1995). Further discussion of fog oil deposition can be found at 5.2.2.5.A.1 and and 5.2.2.15.B.1. In summary, deposition studies demonstrate only extremely small quantities of fog oil can potentially deposit on surfaces and these amounts represent an inconsequential impact to the environment.

**5.2.2.6.4.1 RCP Alternative.** The amount of fog oil used during obscurant training under the RCP Alternative (for TG 7.2, 7.3 and 7.4) would be up to 125,500 gallons (476,900 liters) per year as discussed in subsection 5.2.2.5.A.1.1. The amount would be distributed over the four training areas.

The maximum depositional amount predicted by models (COE KC, 1997b) on soil in the immediate vincinity of the generators was 0.01 $g/m^2$. This deposition rate was based on one static fog oil exercise involving 20 generators, producing fog oil smoke for 90 minutes and consuming 1,200 gallons (4,560 liters) of fog oil during the process. If static training is conducted 47 times a year using the same maximum conditions used in the model, 0.472 $g/m^2$ would be deposited on soil immediately downwind of 20 operating static generators over the course of a year.

Most hydrocarbons contained in fog oil are quite susceptible to microbial degradation. Deposition of the fog oil at the maximum rate of 0.472 $g/m^2$ during one year, is well within the documented ability of soil microbes to destroy the fog oil (Atlas, 1981) without allowing a measurable build up in the soil. Therefore no adverse impacts to soil are expected to occur.

**5.2.2.6.4.2 OPTM (Army's Proposed Action) Alternative.** The amount of fog oil used during obscurant training under the OPTM (Army's Proposed Action) Alternative (for TG 7.2, 7.3 and 7.4) would not exceed 84,500 gallons (321,100 liters) per year as discussed in subsection 5.2.2.5.A.1.2. Therefore no adverse impacts to soil are expected to occur.

**5.2.2.6.4.3 EPTM Alternative.** The amount of fog oil used during obscurant training under the EPTM Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be further reduced and not exceed 49,500 gallons (188,100 liters) per year as discussed in subsection 5.2.2.5.A.1.3. Therefore no adverse impacts to soil are expected to occur.

**5.2.2.6.5 Issue: *Maintenance Training and Operations.*** TG 2.2 BIDS Maintenance, TG 3.2 FOX Maintenance, TG 7.5 Obscurant Generator Maintenance and TG 11.3 Vehicle Maintenance could result in the uncontrolled release of oils, greases, or fluids to the environment.

**5.2.2.6.5.1 RCP Alternative.** Training actions that require instruction in the areas of vehicle and equipment maintenance include are discussed in subsection 5.2.2.5.A.3.1.

- **Indirect Impact.** Oils, greases or other fluids could be spilled during maintenance. If the area where the demonstration occurs is not paved, then the spill could impact soils. A direct long-term adverse impact could result if releases are not contained. The potential impact to surface water and ground water is described in subsection 5.2.2.5 and the impact to aquatic resources is described in subsection 5.2.2.11.

**5.2.2.6.5.2 OPTM (Army's Proposed Action) and EPTM Alternative.** This training methods alternative specifies that maintenance training on vehicles and equipment will be conducted at a site designed to control surface water runoff. A release of oil or grease as a part of the maintenance training would not reach soil. Therefore, no adverse impact to soil is anticipated.

## 5.2.2.7 Infrastructure

The following issues related to Infrastructure have been identified with the implementation of the planned BRAC training objectives at FLW:

- Adequacy of existing utility systems;
- Energy usage; and
- Adequacy of existing roadways.

**5.2.2.7.1 Issue: *Adequacy of Existing Utility Systems.*** As discussed in subsection 4.7.1 the analysis of utility system adequacy is based upon consideration of the "effective population". The effective population is determined by adjusting the population figures presented in Table 2.3 to account for the amount of time each population group will spend on the installation and therefore the amount of utility support they will require. Using the population figures from Table 2.3, the relocation of the Chemical School, Military Police School and associated activities to FLW will increase the estimated effective population at FLW from approximately 14,017 persons to approximately 23,126 persons.

As illustrated on Table 2.3 the effective population at FLW in 1990 was approximately 23,953 persons. The estimated effective population that each of the utility systems can support, and the amount of excess capacity available for each of the utility systems is presented in Table 5.15. As illustrated on Table 5.15, the capacities of the utility systems exceed the estimated requirements, and are therefore adequate to service the anticipated increase in population.

**Table 5.15:**
**Utility System Capacity**

| System | System Capacity in Effective Population[1] | Projected Post-BRAC Effective Population (1999)[2] | System Excess Capacity (in Effective Population) |
|---|---|---|---|
| Raw Water | 49,086 | 23,497 | 25,589 |
| Potable Water Treatment | 51,917 | 23,497 | 28,420 |
| Water Storage | 54,867 | 23,497 | 31,370 |
| Water Distribution | 81,711 | 23,497 | 58,214 |
| Wastewater Treatment | 75,676 | 23,497 | 52,179 |
| Electrical System | 42,682 | 23,497 | 19,185 |

Notes: 1 Capacity information presented in subsection 4.7.1
2 Effective Population from Table 2.3

*Source: Harland Bartholomew & Associates, Inc.*

Energy, communication, and municipal solid waste services are contracted from outside sources as discussed in subsection 4.7. Increases to the population at various locations throughout the installation may dictate the need for new or modified service connections to handle the increased demand. In most instances, the utility contractor will provide new service connections or increase capacity based on the demand. Therefore, no adverse impact is anticipated for energy, communication, and municipal solid waste services.

If electrical demand should exceed existing capacity, the system may be easily expanded at relatively low cost, due to: the varied locations of the substations on the installation; the 69-KV loop system; and the 12.47-KV interconnecting distribution system. Expansion of the 69-KV substations and substations feeders, or construction of new substations could be easily and quickly accomplished under long-term contract with Sho-Me Power, with the government incurring only the comparatively minimal cost of the 12.47-KV distribution feeders. Sho-Me Power has excess generating capacity and will construct additional substations as they are required.

Service connections and minor modification may be needed to serve the needs of the increased population at various locations on the installation following the BRAC action. Most of these connections and modifications should not cause an adverse impact. Extensive modifications and extension of services will be required for the CDTF and the Evasive Driving Area due to the remote site locations required by TG 6.3 Advanced NBC Decon Training and TG 11.2 Evasive Driving Training.

The general policy at FLW is that remote training areas are serviced with electricity only; water and wastewater services are provided by portable means. Due to the nature of training at the CDTF and the classroom requirement for Evasive Driving Training, water, wastewater, and natural gas services may be necessary at these remote facilities. However, the Evasive Driving Training area is located within 1,000 feet of existing utility services and no adverse impact is anticipated.

#### 5.2.2.7.1.1 RCP and OPTM (Army's Proposed Action) Alternatives

- **Indirect Impact.** A potential long-term, adverse impact would occur with the need to extend additional utility lines to the CDTF. The CDTF site is located approximately 1.5 miles (2.4 kilometers) west of the cantonment area. Potable water, sewage, and natural gas do not currently service this area. To connect the facility to the installation's existing systems would require extending the existing utility lines from the cantonment areas. The creation of addition utility lines would increase the maintenance required by the utility service providers and would therefore result in a long-term adverse impact associated with the Advanced NBC Decon Training. A more detailed assessment of the utility needs and the associated construction requirements at the CDTF are discussed in subsection 5.3.2.7.

#### 5.2.2.7.1.2 EPTM Alternative

- **Direct Impact.** The impact of the EPTM Alternative for the Advanced NBC Decon Training is the same as described above in subsection 5.2.2.7.1.1. No natural gas, sewage, or water service would be provided to the Evasive Driving Training area under the EPTM Alternative. Therefore, the impact of the utilities needed to service this training requirement would be reduced.

**5.2.2.7.2 Issue: *Energy Usage.*** The increase in effective population and the increase in facilities at FLW will result in an increase in the energy consumption by the installation. Non of the individual training activities will create an adverse impact due to energy consumption. In addition, the increased effective population associated with the BRAC action would be the same regardless of the implementation alternative selected. As described in subsection 5.2.2.7.1 (and illustrated on Table 5.15), the utility systems have the capacity to handle the increased demands of the added square footage required to meet new requirements. Fort Leonard Wood currently has approximately 11.7 million square feet of facilities requiring heating and cooling. To minimize the increase in energy demand of the new facilities, any new facility and any existing facility that is renovated will meet the energy standards of AR 11-27. Energy policies specific to FLW are contained in Supplement 1 to AR 11-27 (FLW, 1992a). New facilities would be required to adopt and abide by these same policies.

**5.2.2.7.2.1 RCP Alternative.** As a whole, the RCP Alternative under the Army's Proposed LU & FP (CH&I) will add approximately 1.6 million square feet to the facilities at FLW requiring heating and electricity based on the amount of space programmed for use at FMC. This increase in square footage is approximately 13 percent. No adverse impact is anticipated due to the increase in energy consumption.

**5.2.2.7.2.2 OPTM (Army's Proposed Action) Alternative.** The OPTM (Army's Proposed Action) Alternative is anticipated to add approximately 1.3 million square feet (an 11 percent increase) to the total amount of facilities requiring heating and electricity. The reduced square footage requirement compared to the RCP Alternative is due in part to the collocation of the Military Police School and Chemical School libraries and museums with the existing Engineer School library and museum (TG 9.1 and 9.2, respectively). Therefore, less energy demand would be created using the OPTM (Army's Proposed Action) Alternative. No adverse impact is anticipated due to the increase in energy consumption.

**5.2.2.7.2.3 EPTM Alternative.** Compared to the OPTM (Army's Proposed Action) Alternative, the EPTM Alternative would reduce the total square footage of buildings requiring heating and electricity by 17,000 square feet. The reduced square footage requirement is due to the elimination of classroom for the following training objectives: TG 4.3 GMT, NBC Personnel Protective Equipment; TG 4.4 Signals & Other Non-Verbal Communications; TG 4.5 Radio Communications; and TG 11.2 Evasive Driving Training. Although this difference is small, it would reduce the energy demand compared to the OPTM (Army's Proposed Action) Alternative.

**5.2.2.7.3 Issue: *Adequacy of Existing Roadways.*** The implementation of the Army's Proposed LU & FP (CH&I) will increase development in an area north of Lincoln Hall. This increase in development will also concentrate automobile traffic in that area. As described in subsection 4.7, Military Traffic Management Command, Transportation Engineering Agency (MTMCTEA) measured existing level-of-service for major intersections at FLW. Traffic projections were also developed.

Subsection 5.3.2.7.3 in Step 2 of the environmental consequences analysis (below) provides a discussion concerning modification to the existing installation roadway system required to alleviate the impacts associated with the increase in activity near Lincoln Hall. Intersection improvements that have been proposed for the installation are documented in the MTMCTEA report. These include improvements proposed prior to BRAC 95 actions, BRAC related improvements, and additional improvements proposed by the MTMCTEA to improve traffic flow. Specific roadway infrastructure improvements specified in the Army's Proposed Action include the:

1) realignment of Nebraska Avenue between First Street and Third Street, including the reconstruction of the intersection of Nebraska Avenue with Third Street, Headquarters Avenue, and First Street;

2) improved signalization of the intersection of the realigned Nebraska Avenue and First Street;

3) improvement of Gate Street north of Lincoln Hall and connection of Gate Street to the Engineer Center complex to allow for traffic flow between Missouri Avenue and the Engineer Center complex along Gate Street; and

4) the improvement of the Gate Street intersection with Missouri Avenue, including the construction of an additional right turn lane off of Gate Street.

These improvements will result in a minor amount of clearing and the construction of additional impervious hardstand. These impacts are associated with the construction effort as part of the General Instruction Facility (Project 46090) are discussed in Step 2 of this analysis.

Implementation of the proposed training actions will also require the repair, expansion and modernization of several roads and road segments within the range and training areas. These repairs, expansions and modernizations will be accomplished as part of additional maintenance as a part of the Range Modifications (Project 46094) construction project.

- **Indirect Impact.** The realignment of Nebraska Avenue and Gate Street, and the other associated improvements, will alleviate minor impacts on traffic flow associated with the increased development north of Lincoln Hall. The repair, expansion and modernization of roads and road segments near the ranges ad training areas will result in improved (routine and emergency) access to these areas. All of the roads and road segments near the range and training areas are designed for restricted access and are not used by through traffic, consequently the utility of the improved access will be limited.

## 5.2.2.8 Hazardous/Toxic Materials

Implementation of the proposed action will result in the following issues with respect to hazardous or toxic materials.

- Release of unburned fuels from FFE deterrent training;
- Maintenance training and operations;
- Increase in types and quantities of hazardous materials;
- Increase in types and quantities of radiological isotopes;
- Management of toxic agents; and
- Use of fog oil obscurant.

**5.2.2.8.1 Issue: *Release of Unburned Fuels from FFE Deterrent Training.*** Flame field expedient deterrents training activities are discussed in subsection 5.2.2.5.A.5.1 above. The Army Proposed LU & FP (CH&I)) for training with TG 1.3 Mine and Obstacles Designed to Prevent Movement is located near the southern end of the installation at Range 27A. Alternative FFE deterrent training sites are illustrated on Figure 5.2. This location is approximately 6 miles (9.6 kilometers) south of the cantonment area.

**5.2.2.8.1.1 RCP Alternative.** As discussed in subsection 5.2.2.5.A.5.1 above, FFE deterrent training will use approximately 900 gallons (3,420 liters) of thickened fuel would be used in each of 41 training cycles per year and will result in approximately 2,870 gallons (10,906 liters) of unburned fuel per year deposited on site, however due to natural degradation the amount would be somewhat less.

- **Direct Impact.** This quantity of fuel repeatedly released into the environment could create a significant adverse impact. The potential impact of an uncontrolled release of unburned fuel into the environment on surface waters, groundwater, and soils is described further in subsection 5.2.2.5, and subsection 5.2.2.6 respectively. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60, located in subsection 5.5.5.

  An estimated 36,900 gallons (140,220 liters) of fuel would be used annually to conduct this training. Increasing the amount of fuel brought to FLW and transported to the site would increase the potential for spills to occur. The distance to the training area increases the possibilities that spills may occur during transport. The existing spill plans in place at FLW (Radian, 1994b) adequately address the procedures for cleanup should a fuel spill occur. Therefore, no direct adverse impact would occur to the environment as a result of spills from increased usage and transport of fuel.

- **Indirect Impact.** Over time, the area where the training is conducted would require environment cleanup and monitoring to control migration of the fuel from the site. An indirect impact would occur since the site would require monitoring and remediation at a later date.

**5.2.2.8.1.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM Alternatives would result in smaller impacts than those associated with the RCP Alternative. The degree of the impacts would be lessened as a result of the smaller amount of fuel used (550 gallons (2,090 liters) per training cycle vs 900 gallons (3,420 liters) for the RCP Alternative). As discussed in subsection 5.2.2.5.A.5.2 above, FFE deterrents training will use approximately 550 gallons of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 1,845 gallons (7,011 liters) of unburned fuel on the soil per year. In addition, modifications to the Wall-of-Flame training would be designed and constructed to collect unburned fuel. Additionally, under this training method, the amount of fuel ignited during training exercises is reduced from approximately 36,900 gallons (140,220 liters) per year to approximately 22,550 gallons (85,690 liters) per year.

Compared to the RCP Alternative described in subsection 5.2.2.8.1.2, the reduced quantity of fuel being used would decrease the estimated amount of fuel left unburned. The containment system currently specified would greatly reduce, but not eliminate the potential for unburned fuel from entering the environment. Periodic monitoring, treatment and/or disposal of the contained materials would be required. Complete capture and control of all fuel releases would be unlikely making cleanup of the site potentially necessary in the future. Therefore, some impact to the environment may still occur.

**5.2.2.8.2 Issue: *Maintenance Training and Operations.*** Maintenance training on equipment and vehicles in exterior areas without proper spill controls may result in oil or fluids being released into the environment. See subsection 5.2.2.5.A.3.1 for additional discussion of this issue.

**5.2.2.8.2.1 RCP Alternative.** Subsection 5.2.2.5.A.3.1.1 provides additional discussion concerning the RCP Alternative.

- **Direct Impact.** Oils, greases or other fluids could be spilled during maintenance. If the area where the demonstration occurs is paved, then the spill could enter a storm water conveyance system. If the area used for training is not paved, then a spill might enter directly into the soil or be transported by runoff to surface waters. A short-term direct adverse impact could result if oils are not contained.

- **Indirect Impact.** Migration of oils and fluids from the site could cause direct impacts on other areas. The potential impact to surface waters, groundwater, and soils is described further in subsections 5.2.2.5 and 5.2.2.6 respectively. An accidental release of oils might also cause a violation to the current NPDES permit described in subsection 4.9.

**5.2.2.8.2.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** This training method includes maintenance training on vehicles and equipment at sites designed to control surface water runoff, therefore, oil and fluids are much less likely to enter the environment. Operation in conformance with the NPDES permit and periodic monitoring should eliminate the potential for adverse impacts.

**5.2.2.8.3 Issue: *Increase in the Type and Quantities of Hazardous Materials.*** Implementation of the training methods will result in the use of additional types and quantities of hazardous materials at FLW. The following training activities will cause additional hazardous materials to be used at FLW: TG 3.1 FOX Battlefield Employment and Operations; TG 4.3 General Military Training, NBC Personal Protective Equipment; TG 5.1 Basic Military Functions; TG 5.2 Advanced Law Enforcement and Operations Other-than-War; TG 6.1 NBC Procedures; TG 6.2 NBC Equipment; TG 6.3 NBC, Decontamination Advanced Proficiency Test (Toxic Agent); and TG 6.4 NBC Survival Recovery.

A list of the hazardous materials used in association with these training activities is contained in Volume III, Appendix B, Table B.7 of the EIS. A more thorough discussion of the toxic agents and their binary compounds used during TG 6.3 Advance NBC Decon training is contained in subsection 5.2.2.8.5 and Volume III, Appendix B, subsection B.2.12.3. A more thorough discussion of fog oil used with Training Activity Group 7.0, Obscurant Procedures is contained in subsection 5.2.2.8.6 and in Volume III, Appendix B, subsection B.2.12.5.

Fort Leonard Wood currently uses a number of hazardous materials as described in subsection 4.8 that require special management procedures for the safe handling, transportation, storage, and disposal of the material. The installation Spill Prevention and Response Plan would be updated to include the additional sites where hazardous materials are handled or stored. The Spill Prevention and Response Plan would also include procedures to be followed in the event of a spill or release. A site-specific plan spill response plan would be prepared for the additional sites where hazardous materials would be handled or stored. These procedures would include detection, reporting, containment, clean up and disposal. Even with adequate management plans in place, additional hazardous materials at FLW increases the potential for a

release to occur as a result of inappropriate handling, transportation, storage, disposal or spill response. The same quantities and types of hazardous materials would be used regardless of the land use alternative selected.

Implementation of any of the three training method (RCP, OPTM (Army's Proposed Action) and EPTM) Alternatives will result in the use of similar type and quantities of hazardous material currently used to conduct training at the Military Police School and Chemical School. Most of the training activities associated with these training goals are conducted in controlled environments such as classrooms, laboratories, or simulators. Use of hazardous materials under these controlled conditions is considered to have no adverse impact since the potential for a release of a hazardous material into the environment is greatly reduced.

- **Direct Impact.** Hazardous materials used in field exercises during training for TG 3.1 FOX Battlefield Employment and Operations, TG 6.1 NBC Procedures and TG 6.4 NBC Survival Recovery may have a direct adverse impact to the environment. Hazardous materials used as chemical agent simulants include diethyl phthalate, benzaldehyde, cyclohexanone, eucalyptol, methyl salicylate (MES), diethyl malonate (DEM), dimethyl phthalate, FC-43, ammonia, acetone, ethyl phthalate, isopropyl and anisole. During the training activities MES and DEM will be mixed with sand in trays and placed in shallow earthen pits. When the training is concluded, the trays containing the hazardous materials will be recovered.

  Diluted mixtures of MES and DEM are used as Persistent Chemical Agent Simulants (PCAS). The PCAS are dispersed onto soldiers, equipment and terrain to train personnel in the identification, marking, and decontamination of the PCAS. Chemical Agent Disclosure Solution (CADS) is used to check the effectiveness of students' identification and decontamination of the PCAS. The PCAS and CADS are not listed as hazardous substances, although due to its ignitability, the CADS is considered a hazardous waste (FMC, undated, b).

- **Indirect Impact.** An indirect impact may result due to the additional burden to manage the increase of hazardous materials at FLW. With each new hazardous material brought to FLW, existing procedures will have to be evaluated to determine if additional, material-specific and site-specific procedures will be required. Increasing the quantities of hazardous materials used at FLW will also require that the existing management procedures be reviewed to assure their adequacy. If a release should occur, immediate action in accordance with the installation Spill Prevention and Response Plan (Radian, 1994) would be implemented to recover or contain the release thus mitigating any adverse impact to the environment.

  Increasing the use of hazardous materials will also increase the requirement for hazardous waste disposal. The handling and disposal of hazardous wastes will be conducted in accordance with existing procedures as described in subsection 4.8.1. Activities classified as continuous generators of hazardous wastes will be authorized to accumulate in a single 55-gallon container before contacting the Environmental Division and relocating the hazardous waste to the Hazardous Waste Accumulation Building (Building 2229). Units that generate hazardous wastes intermittently, will contact the Environmental Division immediately to arrange turn-in of the hazardous waste at Building 2229. The on-post generator will be responsible for packaging the hazardous waste in an approved DOT hazardous material container and preparing the necessary turn-in document prior to transferring the hazardous wastes to Building 2229.

  Hazardous wastes brought to Building 2229 will be transported off-post for reuse, treatment or disposal within 90 days after arrival. In no event will hazardous wastes be disposed at FLW. Following the current practice, any hazardous waste generated at FLW will be disposed off-post at a facility approved for proper treatment, storage or disposal of hazardous wastes. Transport of the hazardous wastes from FLW and disposal will be performed by a private vendor using a contract administered by DRMO. Transportation and disposal of the hazardous wastes will be in accordance with all local, state, and Federal laws and regulations, and the terms and conditions of

the contract. A map of the transportation route for the hazardous waste hauler will not be required.

**5.2.2.8.4 Issue: *Increase in the Type and Quantities of Radiological Isotopes.*** In conjunction with TG 6.1 NBC Procedures, TG 6.4 NBC Survival Recovery, and Training Activity Group 8.0 Radiation Safety, additional types and quantities of low-level radiological isotopes will be used at FLW. A list of the radiological isotopes used in association with these training activities is contained in Volume III, Appendix B, Table B.8 of the EIS. The usage, estimated quantity and safety information for each isotope to be used are described beginning in Volume III, Appendix B, subsection B.2.12.8 of the EIS. Fort Leonard Wood currently uses a number of low-level radioactive materials associated with equipment calibration and hospital procedures. An existing NRC license covers operations at the Hospital and use of equipment that is covered by centralized (Army) licenses. Special management procedures are in place for the safe handling, transportation, storage, and disposal of the material as well as spill contingency planning as described in subsection 4.8.7.

The Chemical School would have its own specially designated controlled location for the storage of low-level radioactive materials. Other BRAC related activities that generate low-level radioactive components for disposal would use the current FLW RPO and accumulation facility. The Industrial Operations Command (IOC) would be responsible for arranging and administering the contract for the pickup, transport, and disposal of low-level radioactive wastes from the Chemical School and the RPO. An increased quantity of low-level radioactive wastes requiring disposal would originate from FLW. Since the IOC operates radioactive waste disposal contracts for the Army nationwide, the increases in quantities at FLW would not have an impact on existing contract operations for pickup, transport or disposal. The Barnwell Low-Level Radioactive Waste Disposal Facility would continue to be the destination for low-level wastes originating from FLW. Even with adequate management plans in place, additional low-level radiological isotopes at FLW increases the potential for a release to occur as a result of inappropriate handling, transportation, storage, or spill response.

The focus of all radiological training at the Chemical School is radiation protection and safety. Much of the training parallels that done at colleges and universities across the country but with the focus on military equipment and procedures. The same quantities and types of radiological isotopes would be used regardless of the land use and facility plan alternative selected.

**5.2.2.8.4.1 RCP Alternative**

- **Direct Impact.** A direct adverse impact may occur due to the use of unsealed radiological isotopes. Some small quantities of unsealed radioactive material will be used in the laboratories and in controlled exterior areas to train students how to handle unsealed sources and how to control contamination. These sources will be used in very small quantities (microcurie range) and under very stringent control. Most of the radioactive material will be small sealed sources used in the laboratory as check sources for radiation meters or laboratory measuring equipment. Some larger sealed sources will be used for radiation instrument calibration. For comparison, many of the smoke alarms used in homes contain small sealed sources of radioactive material. For instance, a First Alert Smoke Alarm contains 2 microcuries of Americium 241.

  The larger sources of radioactive material all remain sealed. The primary isotopes are Cobalt 60, Cesium 137, and Strontium 90. These are all commercially produced sources. They are primarily used in standard commercial equipment as calibration sources. Some of them are the same as the sources already being used at FLW to train soil testers. Others are the same as the sources used by commercial construction companies to X-ray load bearing structures. These larger sources of radioactive material are used to train students in the safe use of such devices and how to handle accidents involving similar materials. The largest source of radioactive material used at the Chemical School is 120 Curie of Cesium 137. This sealed source will be housed within a specially designed container located within a specially designed laboratory. This is a commercially

available calibration standard used by the training staff to calibrate health and safety monitoring equipment.

The probability of a release into the environment from radiologic training activities is very low. All sources will be stored in containers specially designed to contain radioactive contamination even in the event of a fire. Sources will be stored in a specially designed vault at the Chemical School to restrict access. Sources will be used in the smallest quantities possible for effective training and then returned to their storage location. At all times, radiological isotopes will be used under the supervision of school staff trained in radiation protection and safety, and in the proper use of the source or device.

A Health Physics Office is part of the Chemical School as special staff to the Commandant. The Health Physics Office will be responsible for managing the Nuclear Regulatory Commission Licenses and the Health Physics (Radiation Protection) Program. The Health Physics Officer will act as the radiation health advisor to the school staff, inspect operations and training that involves radiation, evaluate new or proposed operations and training exercises, and monitor radiation exposure and environmental levels.

- **Indirect Impact.** An indirect impact may result due to the added demand to manage the radiological isotopes at FLW. With each new radioactive material brought to FLW, existing procedures will have to be evaluated to determine if additional material specific procedures will be required. Additional quantities of radioactive materials currently used at FLW will also require that the existing management procedures be reviewed to assure their adequacy.

#### 5.2.2.8.4.2 OPTM (Army's Proposed Action) and EPTM Alternatives

- **Direct Impact.** These alternatives are identical to the RCP Alternative described in subsection 5.2.2.8.4.1 except that it limits training with unsealed radiological isotope sources to classroom and laboratory environments. Since no exterior training with unsealed sources would occur the potential for an uncontrolled release of radiological isotopes into the environment is further reduced. Use of radiological isotopes under these controlled conditions is considered to have no adverse impact since the potential for their release into the environment as a result of exterior training is eliminated.

### 5.2.2.8.5 Issue: *Management of Toxic Agents.*

In conjunction with TG 6.3 NBC Decontamination, Advanced Proficiency Test training activities, the toxic agents VX and GB will be used at FLW. VX and GB are binary agents which are individually prepared at the CDTF. The compounds used to produce the binary agents, GB and VX, are not chemical nerve agents themselves. VX is prepared 2 to 3 times per year. GB is prepared 1 to 2 times per year. The usage, estimated quantity and safety information for the toxic agents and their binary compounds, QL and DF, are described beginning in Volume III, Appendix B, subsection B.2.12.3 and subsection 5.2.2.15.B.5. Requirements for the proper handling, transportation, storage, disposal and spill response for the toxic agents and their binary components are contained in the following documents:

- AR 385-61, The Army Toxic Chemical Agent Safety Program;
- DA PAM 385-61, Toxic Chemical Agent Safety Standards;
- AR 40-8, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX;
- AR 50-6, Army Chemical Surety Program; and
- AR 740-32, Escort Requirements for Chemical Agent Shipments.

Specific application of these requirements for the Chemical School are contained within the CDTF Standard Operating Procedures.

A new CDTF will be constructed at FLW to house the training activities involving the use of these toxic agents. The design of the CDTF will include provisions for the necessary security and operational safety for training with GB and VX. Negative pressure ventilation will be maintained on the facility at all times to prevent the dissemination of any accidental release into the outside environment. Treatment of the air collected from the ventilation system off the training bays is described in subsection 5.2.2.3. The site for the CDTF under the Army's Proposed LU & FP (CH&I) is located approximately 1.5 miles west of the cantonment area to allow ample clear zones. Clear zones around the CDTF will be designated as described in subsection 5.2.2.1 to enhance security and reduce the possibility of public exposure in event of catastrophic failure of the facility.

Transportation of binary components to FLW and to the CDTF will only occur as separate compounds, in separate vehicles, at different times, and by personnel authorized to transport the items. Transportation of binary components will be in accordance with the requirements of AR 50-6, AR 740-32, CDTF standard operating procedures, and Department of Transportation and state requirements. The individual binary components will be stored in separate secured areas within the Installation Ammunition Supply Point, within dedicated ammunition bunkers that include security alarms/intrusion detection systems. Movement of an individual binary component is conducted by teams with a minimum of two personnel, and are always conducted with a Military Police escort. The two binary components are not transported in the same vehicle or at the same time.

CDTF staff members will mix small quantities (up to 7.5 ounces (250 milliliters)) of VX and GB at one time. A maximum of 9 ounces (300 milliliters) of each agent may be present in the CDTF at any one time in accordance with the CDTF standard operating procedures. However, under the Chemical Weapons Convention, the CDTF is authorized to store a maximum of 30 ounces (1,000 milliliters) combined volume of agent. The mixed material will be stored in containers that are approximately 0.3 ounce (10 milliliters) each. The individual 0.3-ounce containers of GB and VX will be kept in a storage vault in the CDTF lab until needed. Training activities will consist of neutralizing the toxic agents.

Decontamination washwater is collected after each training session and tested to determine whether toxic agent residuals remain. The washwater is further treated if residuals of the toxic agents are found to remain. The water is again analyzed for residual agents, and if no presence is detected, the water is pH adjusted and stored for disposal as a special waste.

Recycling of the decontaminated washwater is not considered technologically/economically viable or reasonable because treatment of wastewater for resuse will involve removal of high disolved solids, suspended solids, and residual organics from the wastewater. These residual items will constitute another waste product for which additional disposal or treatment must be found. Because of the generation of another waste during the wastewater recycle process, cost efficiencies will not be gained nor, will greater safety be achieved.

All solid materials used during training exercises with GB and VX , such as outer-garment protective suits, respiratory protectors, rubber boots, etc., are surface decontaminated with agent neutralizing solutions then containerized. Prior to reuse, the suits are monitored for a minimum of 48 hours in accordance with AR 385-61 and provided hygienic treatment in an autoclave. The protective suits are passed through a dry steam autoclave at approximately 250 degrees F and 15 pounds per square inch pressure. Suits may be hygienically treated a maximum of three times, allowing the suits to be worn a maximum of four times by four different personnel.

Decontaminated waste by-products associated with toxic agent training at the CDTF fall into one of the following categories as defined by Missouri 10 CSR 260 (CSR, 1994):

- **"Hazardous waste"**, any waste or combination of wastes, as determined by the commission by rules and regulations, which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may cause or significantly contribute to an increase in mortality or an

increase in serious irreversible, or incapacitating reversible, illness, or pose a present or potential threat to the health of humans or the environment;

- "**Infectious waste**", waste in quantities and characteristics as determined by the department by rule and regulation, including the following wastes known or suspected to be infectious: isolation wastes, cultures and stocks of etiologic agents, contaminated blood and blood products; other contaminated surgical wastes, wastes from autopsy, contaminated laboratory wastes, sharps, dialysis unit wastes, discarded biologicals and antineoplastic chemotherapeutic materials; provided, however, that infectious waste does not mean waste treated to department specifications; or

- "**Special waste**", wastes which are not regulated hazardous waste, which may have physical or chemical characteristics, or both, that are different from municipal, construction and wood wastes, and which potentially require special handling. Consequently, special wastes are wastes which do not meet hazardous waste definition but by the their characteristics, require additional handling when compared to municipal, construction or yard wastes.

**Hazardous wastes** generated at the CDTF include:

- approximately 150 decontaminated protective mask filters per year used by foreign allied forces which contain Chromium;
- mercuric cyanide from the approximately 5,000 detector kits (M256A1) per year;
- silver nitrate from the MINICAMS Chemical Agent Detectors; and
- mercury and silver fluoride from laboratory equipment.

Other materials that come in contact with toxic agents are hazardous until they undergo decontamination. Following decontamination, these articles are classified as special wastes (defined below) and are not considered an USEPA defined hazardous waste.

**Infectious Wastes** are generated as a by-product of the medical monitoring program for all personnel that receive training at the CDTF. This monitoring program is conducted within the administrative areas of the CDTF and includes taking a blood sample from all students prior to training, taking samples from foreign students after the training, and taking a sample from any student that shows signs of potential contamination or that came into physical contact with agent. The infectious wastes include syringes used to obtain blood samples, gauze, test tubes, and other medical materials.

**Special wastes** generated at the CDTF include items used in the decontamination process or materials that undergo decontamination following contact with either the toxic agent GB or VX. Prior to shipment solid items have been surface decontaminated and monitored for a minimum of 48 hours to verify that vapor concentrations above 0.0001 $mg/m^3$ for GB and 0.00001 $mg/m^3$ for VX do not exist; and liquid items will be decontaminated and monitored to less than 20 parts per billion (ppb) of residual agent.

Wastewater resulting from the decontamination of equipment props in controlled atmosphere training rooms flows to a center trench (in each training room), then to a common sump located in Bay 7 in the CDTF. Water is pumped through a closed pipe system to a 20,000 gallon storage tank which is located in a concrete and bermed secondary containment area outside the CDTF building, but still inside the fenced area of the CDTF. The wastewater is stirred by an agitator inside the tank prior to sampling to determine if residuals of GB and VX remain. The sample is analyzed by a GC method which provides a detection limit of 20 parts per billion (ppb). If concentrations are found to be above 20 ppb the wastewater is further treated with DS2 solution. The wastewater will again be tested to assure VX and GB are below 20 ppb. The significance of 20 ppb is drinking water containing nerve agents at this concentration can be consumed by troops in combat areas for up to 7 consecutive days; however, there is a potential for health impacts at this concentration (DA, 1986b).

An analysis of the CDTF wastewater from FMC has recently been conducted. The results are shown below on Table 5.16, with additional discussion contained in Volume III, Appendix I.

**Table 5.16:**
**Chemical Characterization of CDTF Wastewater**

| Parameter | Method | Health Criteria in Air | Result |
|---|---|---|---|
| Alkalinity, mg/L, $CaCO_3$ | EPA 310.1 | NA[a] | 3,350 mg/L |
| Ignitability, degrees F | EPA 1010 | NA | greater than 180 |
| Residual Chlorine, mg/L | EPA 330.5 | NA | less than 0.50 mg/L |
| Total Dissolved Solids, mg/L | EPA 160.1 | NA | 7,390 mg/L |
| Total Organic Carbon, mg/L | EPA 415.1 | NA | 1,540 mg/L |
| Total Suspended Solids, mg/L | EPA 160.2 | NA | 2,480 mg/L |
| Diethylenetriamine, mg/L | EPA 8015 mod | [1]TLV-TWA 4.2 $mg/m^3$ | 300 mg/L |
| Ethylene glycol monomethylether, mg/L | EPA 8015 mod | [2]TLV-TWA 16 $mg/m^3$ | 680 mg/L |
| pH | 501 Orion Meter | NA | 10.23 |
| GB Agent, $\mu g/L$ | Gas Chromatograph | [3]AEL-TWA 0.0001 $mg/m^3$ | less than 20 $\mu g/L$ |
| VX Agent, $\mu g/L$ | Gas Chromatograph | [4]AEL-TWA 0.00001 $mg/m^3$ | less than 20 $\mu g/L$ |
| 48 hr. Tox. to *Ceriodaphnia dubia* | EPA 600/4-90/027F | NA | 1.5% LC50 |
| 96 hr. Tox. to *Pimephales promelas* | EPA 600/4-90/027F | NA | 3.8% LC50 |

Notes:
a NA = Not Applicable
1 Threshold Limit Value-Time Weighted Average (TLV-TWA) of 4.2 $mg/m^3$ for diethylenetriamine ACGIH (1994)
2 TLV-TWA of 16 $mg/m^3$ for ethylene glycol monomethylether ACGIH (1994)
3 Atmospheric Exposure Limit-Time Weighted Average (AEL-TWA) of 0.0001 $mg/m^3$ for GB (DA, 1996b)
4 (AEL-TWA) of 0.00001 $mg/m^3$ for VX (DA, 1996a)

Results of the CDTF wastewater analysis along with other input data were used to estimate the risk of shipping wastewater from FLW to a commercial disposal or treatment facility by use of the Chemical Accident Statistical Risk Assessment Statistical Model (CASRAM)(FMC, 1997). The CASRAM is a statistical model which predicts the probability of transportation accidents, the probability of a release given an accident and the probability of humans being affected given accidental releases. To predict risks, the model uses type of transportation (e.g., rail, truck, etc.); amount of material shipped and frequency; toxicity of the material; and concentration of the toxic ingredients.

The model contains an extensive meteorological database to statistically model chemical release rates and material dispersion through Monte Carlo sampling of accident scenarios. This information is combined with health criteria for the applicable chemicals to predict exposures from spills to populations along the route traveled.

The probability that one or more persons will be exposed to a concentration exceeding the emergency response criteria, during any given year of operation, is $6.88 \times 10^{-5}$. This probability indicates that one person has a chance of being affected in 348,000 shipments. At this rate it is expected that one person has the potential to be affected by exposure from an accidental spill in 14,500 years of shipping.

Similarly, the probability that 100 or more persons will be exposed to concentrations exceeding criteria, during one spill event is $3.33 \times 10^{-9}$. This probability indicates that 100 people have a chance of being affected by one spill event in 7,200,000,000 shipments. At this rate one can expect 100 people to be affected by a release event in 300 million years of shipping.

The statistical probabilities predicted by the CASRAM model show the chance that a person or group of people will be affected by a transportation related spill of the CDTF wastewater is very remote.

The decontamination of these items will have been completed in accordance with established and approved procedures. Items that will be classified as special wastes include approximately:

- 100,000 gallons (38,000 liters) per year of liquid wastes (pH of approximately 10.5);
- 12,880 pounds (5,796 kilograms) per year of solid wastes consisting entirely of used Battle Dress Overgarment (BDO) uniforms, the estimate for BDO uniforms includes the charcoal filters used in the protective masks;
- 1,050 pounds (472.5 kilograms) per year of other solid wastes consisting entirely of German Army suits;
- 2,800 pounds (1260 kilograms) per year of other solid wastes consisting entirely of U.S. Navy chemical protective overgarments; and
- less than fifty 55-gallon (209 liters) drum containers of other decontaminated solid wastes per year which consist of detection kits and paper, decontamination kits, and other expendable materials used to support training at the CDTF.

The same quantities and types of toxic agents would be used regardless of the land use alternative selected. The location where the toxic agents are to be used at FLW has the potential to create additional impacts to other environmental resource categories.

**5.2.2.8.5.1 RCP Alternative.** The only difference between the three training method (RCP, OPTM (Army's Proposed Action) and OPTM) alternatives is the method for disposal of the **special wastes**. Under the RCP Alternative, the special wastes would be monitored for a minimum of 48 hours and then thermally treated on-site using a thermal treatment unit similar to the one currently used at FMC. Any ash remaining following thermal treatment of the special waste would be disposed off-post as a solid waste in accordance all Federal, state, and local regulations. The impacts associated with the thermal treatment unit are more thoroughly described in subsection 5.2.2.3.

Management procedures for the safe handling, storage, and disposal of the special wastes would be included in the CDTF standard operating procedures. The Installation Spill Prevention and Response Plan would be updated to include the CDTF as a site where hazardous and special wastes are generated and stored. The Spill Prevention and Response Plan would also include procedures to be followed in the event of a spill or release of special waste. A site-specific plan would be prepared for the hazardous and special wastes at the CDTF. These procedures would include detection, reporting, containment, clean up and disposal. Response personnel would require training in the specific procedures to be followed when responding to a spill or release of special waste.

Hazardous wastes that are not decontaminated on site will be handled and disposed as hazardous wastes following the procedures described in subsection 4.8.1 and 5.2.2.8.4. As a continuous generator of hazardous wastes, authorization would be arranged for the CDTF to accumulate hazardous wastes in a single 55-gallon container. The Environmental Division would be contacted to arrange temporary storage of the hazardous waste at Building 2229. The materials would be packaged in an approved DOT hazardous material container, and the necessary container labels and manifest documents would be prepared prior to transferring the hazardous wastes to Building 2229.

Hazardous wastes brought to Building 2229 will be transported off-post for reuse, treatment or disposal within 90 days after arrival. In no event will hazardous wastes be disposed at FLW. Following the current practice, any hazardous waste generated at FLW will be disposed off-post at a facility approved for proper treatment, storage or disposal of hazardous wastes. Transport of the hazardous wastes from FLW and disposal will be performed by a private vendor using a contract administered by DRMO. Transportation and disposal of the hazardous wastes will be in accordance with all local, state, and Federal laws and regulations, and the terms and conditions of the contract. A map of the transportation route for the hazardous waste hauler will not be required.

Medical infectious wastes would be handled and disposed as a regulated medical waste (RMW) following the procedures described in subsection 4.8.9. RMW generated within the administrative area of the

CDTF would be collected daily (twice weekly at a minimum), placed in an approved (by regulation) container, and stored in a secure area. Within 10 days, the RMW would be picked up and disposed by a licensed waste disposal vendor under contract with USA MEDDAC. The existing contract for pickup and disposal of RMW would need to be modified to include the additional pickup point at the CDTF.

Fort Leonard Wood has special management procedures in place for the safe handling, transportation, storage, and disposal of hazardous wastes and medical infectious wastes as well as an Installation Spill Prevention and Response Plan (Radian, 1994). The additional quantities of these materials which will be created as by-products of Toxic Agent training will require that the existing management procedures be reviewed to assure their adequacy. Site-specific spill response plans will need to be prepared for the CDTF.

Even with adequate management plans in place, additional handling operations at FLW will increase the potential for a spill to occur as a result of inappropriate handling, transportation, storage, disposal or spill. The greatest opportunity for accidental spills would occur at the storage areas and at locations where the materials are transferred to vehicles for transportation. As part of the planned Chemical Defense Training Facility, discussed in Step 2, the temporary (less than 90-day) storage locations at the CDTF will include secondary containment.

- **Direct Impact.** Considering the nature of the work, training regimen, safety programs, medical surveillance of the staff, and available medical support, operation of the CDTF does not pose an unacceptable risk to the on-site workers. Similarly, there is no reasonable foreseeable risk to the public or to the environment. Therefore no adverse impact to the environment is anticipated as a result of the proposed training with toxic agents at FLW.

- **Indirect Impact.** An indirect impact on the amount of management effort and labor will result in association with implementation of the special handling procedures required by the transportation, storage, and disposal of decontaminated waste by-products (special wastes), generated during toxic agent training at FLW.

**5.2.2.8.5.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** In lieu of treatment on-site using a thermal treatment unit, all **special wastes** will be transported and disposed of by appropriately licensed contractors in accordance with all applicable Federal, state and local regulations. As an extra precaution, hazardous wastes and medical infectious wastes will be treated and disposed of as discussed in subsection 5.2.2.8.5, above. These **special wastes** will be transported in accordance with the more stringent hazardous waste requirements.

Prior to transport, the Army will analyze each batch of CDTF wastewater to verify that the concentration of VX and GB are below the established health related standard of 20 ppb. The Army will also manifest the wastes to ensure that they have been characterized correctly and monitor the transportation and disposal contractor to ensure that all appropriate regulations are followed. The disposal contractor will be responsible for proper disposal of the wastes in accordance with their permit requirements. Although FLW does not currently generate or dispose of materials designated as special wastes, the disposal contract has provisions for the disposal of non-RCRA, non-State regulated wastes which could be expanded by contract modification to include special wastes. Implementation of this treatment method is consistent with treatment methods used in other Army programs which deal with higher concentrations and volumes of material.

Selection of the preferred commercial contractor and preferred disposal location will be based upon:

- the nature of the disposal method;
- the disposal method performance in limiting the risk of future contamination;
- the performance of the disposal facility, to include environmental management and compliance practices; and

- the disposal contractor having appropriate Federal, state and local environmental licenses and permits.

As discussed in Volume III, Appendix C a review of alternative disposal methods, commercial disposal contractors, and disposal sites indicated that numerous sites, methods and contractors were authorized and interested in handling disposal of the decontaminated liquid and solid special wastes associated with toxic agent training. As new technologies become available and effective in handling the wastes, the Army would base their decision as to which disposal method to use based on competitive selection criteria.

- **Direct Impact.** As described above for the RCP Alternative, no direct adverse impact is anticipated.

- **Indirect Impact.** An indirect impact may result due to implementation of special handling procedures required for the transportation, storage, and use of toxic agents at FLW. Since the disposal of the special wastes would be off-site by a commercial contractor, there would be less potential for impact at FLW.

  Fort Leonard Wood has special management procedures are in place for the safe handling, transportation, storage, and disposal of hazardous wastes, medical infectious wastes and other special wastes, as well as installation Spill Prevention and Response Plan (Radian, 1994). The additional quantities of these materials which will be created as by-product of Toxic Agent training will require that the existing management procedures be reviewed to assure their adequacy as discussed in subsection 5.2.2.8.5.1. Even with adequate management plans in place, additional handling operations at FLW will increase the potential for a spill to occur as a result of inappropriate handling, transportation, storage, disposal or spill response. The greatest opportunity for accidental spills would occur at the storage areas and at locations where the materials are transferred to vehicles for transportation. As part of the planned Chemical Defense Training Facility, discussed in Step 2, the temporary (less than 90-day) storage locations at the CDTF will include secondary containment.

  Transportation of special wastes off-post will be performed by licensed operators in accordance with all Federal, state and local regulations. Additionally, although the special waste materials are classed as a non-hazardous waste, the Army has elected to store and ship the wastes in accordance with the more stringent Federal, state and local hazardous waste transportation requirements. Federal, state and local regulations governing the transportation of hazardous waste specify proper shipping containers, labeling and placarding requirements, manifesting, and emergency actions to be taken should transported waste be accidentally be spilled. Rigid compliance with these regulations will be observed. The contracted waste hauler would not be required to notify the public of the intended transportation route from FLW to the contracted disposal facility.

  A CASRAM model was used to determine the risks of transporting the special wastes off-post for disposal (FMC, 1997). The model uses shipment attributes such as route traveled, population centers along the route, container type, container size, and the toxicity of the material to statistically predict the probability that from 1 to 500 people will be affected. It was estimated that 24 shipments of special wastes would be transported off FLW for disposal. The model indicated that probability of an accident was one in 2,671 shipments. The probability of an accident causing a release to occur was one in 14,142 shipments. The probability of exposure to one or more individuals was one in 348,000 shipments. The probability of exposure to a population group of 100 or more was one in over 7 billion shipments. Therefore, the statistical probability predicted by the CASRAM model show the chance of citizens being affected by a transportation related spill of special wastes is extremely low. Additional information on the CASRAM model is contained in subsection 5.2.2.15.B.6.2.

In the unlikely event of a spill of decontaminated solid items, the solid items could be collected and repackaged for shipment. Prior to release from the CDTF all of the items will have been decontaminated and monitored to ensure they are not off-gassing GB and VX for a minimum of 48 hours. The transportation contractor would be required to train and equip a response team that would respond to any spill.

In the unlikely event of a spill of decontaminated liquid materials, an analysis of the site would be required. The primary impact to the area would associated with the high salt content of the decontaminated washwater. Nevertheless, the transportation contractor would be required to train and equip a response team that would respond to any spill.

**5.2.2.8.6 Issue: *Accidental Spills of Fog Oil.*** In conjunction with Training Activity Group 7.0 Obscurant Procedures training activities, fog oil will be used at FLW on a regular basis. Fort Leonard Wood has special management procedures are in place for the safe handling, transportation, storage, and disposal of oils as well as Installation Spill Prevention and Response Plan (Radian, 1994). The installation Spill Prevention and Response Plan would be updated to include the additional sites where fog oil would be used and stored. The Spill Prevention and Response Plan would also include procedures to be followed in the event of a spill or release. A site-specific plan spill response plan would be prepared for the additional sites where fog oil would be stored. These procedures would include detection, reporting, containment, clean up and disposal. Additional quantities of oils at FLW will require that the existing management procedures be reviewed to assure their adequacy. Even with adequate management plans in place, additional oils at FLW increases the potential for a spill to occur as a result of inappropriate handling, transportation, storage, disposal or spill response. The greatest opportunity for accidental spills would occur at the fog oil storage areas and at locations where the fog oil generators are fueled.

**5.2.2.8.6.1 RCP Alternative.** The amount of fog oil that could be spilled would be limited by the amount of fog oil used during the training event that requires the most fog oil usage. Subsection 5.2.2.5.A.2 contains additional information on this issue.

- **Indirect Impact.** Accidental spills would have a greater potential to be dispersed into the environment with precipitation since the storage area would be uncovered in the RCP Alternative. Use and storage of fog oil under these conditions is considered to cause an indirect long-term adverse impact. Impacts from minor spills in the field are not expected due to spill recovery procedures that will be place (Radian, 1994) and due to the natural attenuation characteristics of fog oil.

**5.2.2.8.6.2 OPTM Alternative.** As discussed in subsection 5.2.2.5.A.2.2 the potential for a long-term adverse impact is reduced through the implementation of this alternative, as reduced quantities of fog oil will be used and fog oil would be stored in covered storage areas.

- **Indirect Impact.** With storage operations conducted within a covered storage area the potential for fog oil to enter the environment through precipitation runoff is reduced. Therefore, indirect long-term adverse impacts are reduced.

**5.2.2.8.6.3 EPTM Alternative.** As discussed in subsection 5.2.2.5.A.2.3 the potential for a long-term adverse impact is reduced through the implementation of this alternative, as reduced quantities of fog oil will be used and fog oil would be stored in covered storage areas.

- **Indirect Impact.** With storage operations conducted within a centralized covered storage area and the total quantity of fog oil used reduced from 125,500 gallons (476,900 liters) per year to 49,500 gallons (188,100 liters) per year, the potential for fog oil to enter the environment through precipitation runoff is reduced. Therefore, indirect short-term adverse impacts are reduced.

## 5.2.2.9 Munitions

Implementation of the proposed action will result in the following issues with respect to munitions:

- Increase in types and quantities of live munitions;
- Increase in types and quantities of obscurant and signal munitions; and
- Munitions containing hazardous constituents.

### 5.2.2.9.1 Issue: *Increase in the Type and Quantities of Live Munitions.*

Implementation of the training methods will result in the use of additional types and quantities of live munitions at FLW. The following training activities will bring additional live munitions to FLW: TG 1.5 Night-Time Squad Engagement; TG 1.8 Warfighting and Tactical Operations; TG 10.1 Weapons Training; and TG 10.2 Weapons Training, Pistol. A list of the live munitions and the estimated quantity used in association with these training activities is shown on Tables 5.13 and 5.14. The amount of these munitions currently used at FLW is also listed along with the percent increase of each munition when the Chemical School, Military Police School and other associated units are relocated to FLW.

Fort Leonard Wood already uses a number of munitions, in addition to those listed, that require special management procedures for safe handling, transportation, and storage as well as disposal of unexploded ordnance. With each new munition brought to FLW, existing procedures will have to be evaluated to determine if additional procedures will be required. Increasing the quantities of live munitions used at FLW will also require that the existing management procedures be reviewed to assure their adequacy. Increasing the use of live munitions will also increase the requirement for disposal of unexploded ordnance.

**5.2.2.9.1.1 RCP and OPTM (Army's Proposed Action) Alternative.** Relocation of the current training practices to FLW would result in the use of same type and quantities of live munitions currently used to conduct training at the Military Police School and Chemical School. Table 5.13 shows the quantities of munitions that are anticipated by be used by the Chemical School, Military Police School and Engineer Center, when the training activities are relocated from FMC to FLW.

The difference in munitions usage between the RCP and OPTM (Army's Proposed Action) Alternative and the EPTM Alternative involves the type of munitions used for Mark 19 training. This alternative will include the use of both high-explosive and modified training rounds for Mark 19 training. Training with the high-explosive rounds would be limited to targets that would be located within the existing dud area at FLW. This will eliminate safety concerns involved with expansion of the dud area or the personnel requirements that would be required to have an EOD team standing by during training to dispose of any high-explosive Mark 19 rounds that failed to detonate upon impact. No adverse impact to munitions storage and operations are anticipated due to the increase in types and quantities of munitions.

**5.2.2.9.1.2 EPTM Alternative.** This alternative is identical to the RCP and OPTM (Army's Proposed Action) Alternative except that Army students completing Weapons Training using the Mark 19 will only use 30 modified rounds. No high-explosive Mark 19 rounds will be used by Army students. This change will not make a significant difference in impact to the environment with respect to the types, quantities, and methods of live munitions used. No adverse impact is anticipated.

### 5.2.2.9.2 Issue: *Increase in the Type and Quantities of Obscurant and Signal Munitions.*

Implementation of the training methods will result in the use of additional types and quantities of obscurant and signal munitions at FLW. The following training activities will bring additional obscurant and signal munitions to FLW: TG 4.3 General Military Training, NBC Personal Protective Equipment; TG 4.4 Signals and Other Non-Verbal Forms of Communication; TG 6.1 NBC Procedures; TG 6.4 NBC, Survival Recovery; TG 7.3 Obscurant Employment Proficiency Test (Mobile Operations); and TG 7.4 Obscurant Employment Proficiency Test (Field Training Exercises). A list of the obscurant and signal munitions and the estimated quantity used in association with these training activities is shown

in Volume III, Appendix B, Table B.5 of the EIS. The amount of these munitions currently used at FLW is also listed. The potential impact associated with the use of fog oil as an obscurant is described in subsection 5.2.2.8.5.

Fort Leonard Wood currently uses a number of other munitions in addition to those listed in Volume III, Appendix B, Table B.5 that require special management procedures for safe handling, transportation, and storage as well as disposal of unexploded ordnance. With each new munition brought to FLW, existing procedures will have to be evaluated to determine if additional procedures will be required. Increasing the quantities of obscurant and signal munitions used at FLW will also require that the existing management procedures be reviewed to assure their adequacy. Increasing the use of obscurant and signal munitions will also increase the requirement for disposal of unexploded ordnance.

Implementation of the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives are identical with respect to this issue. Each of these alternatives will include the use of the same type and quantities of obscurant and signal munitions currently used to conduct training at the Military Police School and Chemical School. Volume III, Appendix B, Table B.5 shows the quantities of munitions currently expended by the Chemical and MP schools. When these training activities are relocated to FLW, no adverse impact to munitions storage and operations is anticipated due to the increase in types and quantities of munitions.

## 5.2.2.10 Permits and Regulatory Authority

A wide variety of Federal, state and local laws and acts have been promulgated to protect human health and the environment. Environmental regulations have subsequently been promulgated to implement the laws and acts. In general the regulations:

- Identify the governing agency with the authority to administer the law or act;
- Establish applicability to the regulated community which must comply;
- Identify requirements and restrictions which must be followed;
- In some cases provide for a permitting or license process that can provide additional site specific restrictions to further protect human health and the environment; and
- Establish enforcement procedures and penalties for noncompliance.

Fort Leonard Wood operates in accordance with all Federal, state and local laws and regulations. Environmental permits have been issued to the post for the activities identified in subsection 4.10. The actions associated with the implementation of the planned BRAC training objectives would raise concern over the impact on compliance with existing permits and licenses and the potential need for modifications or new permits or licenses.

The primary focus related to Permits and Regulatory Authority is with the conditions and limitations contained within the permits and licenses which were or will be issued for implementation of the proposed action. These conditions and limits will be used by the regulatory authorities and FLW to manage the activities in such a manner as to eliminate or minimize impacts to public health and mitigate potential impacts on the environment to levels that are acceptable under the permitting process. The conditions and limits were or will be defined during the acquisition of each permit/license in accordance with the application process established in the regulations. Fort Leonard Wood has already obtained several of the required permits for implementing the proposed action and will obtain any additional permits or permit modifications which may be required prior to initiating any regulated activity. The permits which have not yet been obtained require detailed site-specific information and cannot be applied for until the EIS is completed. The following text provides a brief review of the permitting areas which are of concern in evaluating the impacts of the proposed action. Permit issues include:

- Air Quality Management Permits;
- Water Quality Management Permits; and
- Radioactive Materials Licenses.

**5.2.2.10.1 Issue: *Air Quality Management Permits.*** Some of the activities and equipment associated with proposed training activities require FLW to obtain air quality management permits. Existing emissions sources and regulatory compliance are discussed in subsection 4.3. Subsection 5.2.2.3 addresses the air quality issues and permit needs associated with the implementation of proposed training goals at FLW. The MDNR has considered FLW a "major" stationary source under the PSD permitting process. This classification requires that new sources or modifications to existing sources be reviewed to determine if additional permitting or a modification to an existing permit is required.

Fort Leonard Wood is in the process of preparing a Title V air permit application (due in May 1997) as required by the Clean Air Act Amendments of 1990 (CAAA). The Title V process provides a mechanism to consolidate the various stationary source air quality management permits into a single permit. All proposed actions associated with BRAC that result in stationary source air emissions as described in subsection 5.2.2.3 (including those with air permit de minimis emissions) will be addressed during the Title V permit process and evaluated for inclusion (including fog oil usage and operation of the CDTF).

**5.2.2.10.1.1 RCP Alternative.** The RCP Alternative includes implementation of the following activities. These activities are classified under the regulations as potential new sources of emissions as discussed under subsection 5.2.2.3 and would require FLW to obtain and maintain PSD air quality management permits which will be incorporated into the Title V permit:

- Thermal treatment of toxic agent filters and decontaminated materials (TG 6.3); and
- Use of obscurant generators (TG 7.2, TG 7.3, and TG 7.4).

- **Direct Impacts.** Implementation of the RCP Alternative would require permitting the CDTF thermal treatment unit and fog oil smoke training.

  **Thermal Treatment Unit.** Under the RCP Alternative the CDTF will include a thermal treatment unit which will be used for the treatment of decontaminated liquids and solid waste associated with TG 6.3. The air permit for the CDTF was prepared using current standard permitting practices employed by MDNR. Ambient air quality modeling was performed for the thermal treatment unit and all ambient air impacts are well within standards for protection of human health. The ambient air quality model used to simulate this facility is a highly conservative model, meaning that it tends to overestimate actual ambient impacts. The human health analysis, monitoring requirements, and ambient air quality standards used to structure this permit are conservative. The MDNR permit specifies emission limits and requires a stack performance test to quantify selected air pollutant emissions. The stack test will serve as a basis to further measure PM-10, carbon monoxide, dioxins/furans, hydrogen chloride and mercury concentrations. The permit specifies the allowable emission limits for each of these constituents. No detectable quantity of either GB or VX is allowed to be emitted from the stack.

  The thermal treatment unit will have redundant control systems designed to very strict design criteria. No toxic agents will be allowed to be emitted from the unit stack. The impact to the air quality management program for FLW is the need to permit the thermal treatment unit as an emission source. As part of the BRAC process, FLW has applied for and obtained from the MDNR an air permit to construct a Chemical Decontamination Training Facility and Thermal Treatment Unit. The review was conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, "Construction Permits Required." MDNR Permit Number 0495-013 was issued to FLW (Facility ID Number 3860-0004-026) effective 10 April 1995.

  Twenty special conditions are provided for the CDTF permit and include identification of constraints associated with the following: materials which may not be charged to the incinerator, emission limits, and performance testing conditions. The MDNR permit specifically states that the incinerator may NOT be charged with hazardous wastes. This prohibition would include gas mask filters which contain levels of chromium sufficient to characterize them as a hazardous waste and silver nitrate from the MINICAMS receptor pads.

After initial startup of the CDTF thermal treatment unit, FLW is required to conduct emission testing. To validate the control technology efficiencies, permit monitoring requirements for the incinerator include a stack test within 90 days of reaching full operation, but not more than 180 days after initial startup. A Proposed Test Plan must be submitted to MDNR for approval. All performance tests shall be conducted, and data reviewed, in accordance with specified USEPA Test Methods unless an equivalent or alternative test method is otherwise approved by the Director of MDNR.

MDNR concluded in the Section (5) review of application for authority to construct and operate the CDTF as attached to Permit No. 0495-013 that:

- The CDTF is a de minimis addition to an existing major source (the FLW installation);
- No adverse ambient air quality impact is expected to occur as a result of operation of the CDTF;
- Hazardous air pollutants will be emitted from the incinerator in small, allowable amounts but no nerve agents will be emitted since they are neutralized prior to treatment; and
- There are no New Source Performance Standards (NSPS) or NESHAP standards which apply to the CDTF.

**Use of Obscurant Generators.** Under the RCP Alternative, the use of static and mobile fog oil smoke training facilities in TG 7.2, 7.3, and 7.4 has been determined to be a major modification since the net emissions increase of particulate matter and volatile organic compounds could potentially exceed the PSD significance levels. Because of the rates of emissions projected from the smoke training activities, the project is subject to PSD permit review and required air quality modeling in compliance with 40 CFR Part 52 and Missouri State Rule 10 CSR 10-6.060 (8)(C). As part of the BRAC process, FLW has applied for and obtained from the MDNR permit to construct the static and mobile fog oil smoke training facilities. The review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, "Construction Permits Required." MDNR Permit Number 0695-010 was issued to FLW (Facility ID Number 3860-0004-015) effective 15 June 1995. A copy of this permit is provided in Volume III, Appendix J. This training activity includes training in the basic operation of smoke generators. There are three distinct training operations - static, mobile and field training.

Thirty-seven special conditions are provided for the fog oil training facilities permit and include identification of constraints associated with the following: emission limits, ambient air monitoring, meteorological monitoring, soil and vegetation sampling, and other special conditions. The MDNR permit specifically restricts such items as the annual throughput, daily throughput, type of fog oil used, and equipment used. The fog oil shall contain no carcinogens or potentially carcinogenic constituents (MIL-F-12070D). Additionally, the State of Missouri Permit requires that it may not contain more than 0.5 percent by weight of any single hazardous air pollutant and the combination of all hazardous air pollutants may not be more than 1 percent by weight. The permit also requires at least one year of pre-startup monitoring and two years of post-startup monitoring of air quality, soils and vegetation. MDNR concluded in the Section (8) review of application for authority to construct and operate the obscurant (smoke) training school as attached to Permit No. 0695-010 that:

- PSD regulations apply to the smoke training facility;
- this is a major modification at a major facility emitting over 15 tons per year of particulate matter;
- no HAPs above de minimis amounts are emitted in the process;
- no Federal NSPS or NESHAP apply to the operation; and
- special conditions are imposed by the permit.

The amount of fog oil used during obscurant training under the RCP Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 125,500 gallons (476,900 liters) per year as discussed in

subsection 5.2.2.5.A.1.1. The difference between the three viable training alternatives (RCP, OPTM ( Army's Proposed Action), EPTM Alternatives) involve the amount of obscurant (fog oil) that is used to complete the training. The MDNR Air Permit limits the total quantity of fog oil use to 65,000 gallons (247,000 liters) per year. Thus, the RCP Alternative would require the installation to modify the permit to essentially double the annual limitation. Implementation of the RCP Alternative would also require an increase in the daily limit for fog oil specified in the permit from 3,700 pounds (1,665 kilograms) (approximately 481 gallons (1,828 liters)) per day to approximately 1,900 gallons (7,220 liters) per day.

Both the annual and daily amounts would exceed the limits set to protect human health as defined by the NAAQS and the Missouri Department of Natural Resources. Therefore there would be a significant adverse impact. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60, located in subsection 5.5.5.

- **Indirect Impacts.** Indirect impacts of implementing the RCP Alternative include compliance with the permit requirements for the CDTF thermal treatment unit and the fog oil smoke training. Each of these items will require that FLW implement environmental programs. Implementation of the additional operating air permits would require long term activities associated with operating, monitoring, record keeping, reporting and implementing precautions as required by the permits. These are classified as adverse impacts from the perspective of commitment of resources.

**5.2.2.10.1.2 OPTM (Army's Proposed Action) Alternative.** The OPTM (Army's Proposed Action) Alternative is based on the RCP Alternative with two changes which impact on the air permitting issue. The OPTM (Army's Proposed Action) Alternative does not include a thermal treatment unit at the CDTF. The decontaminated (liquid and solid) waste by-products of toxic agent training which would have been thermally treated (under the RCP Alternative) will be containerized and shipped to commercial off-post treatment and disposal facilities. The other change involves the reduction of the fog oil used in the obscurant training program to a volume of 84,500 gallons (321,100 liters) per year, with a maximum of 1,200 gallons (4,560 liters) per day, as discussed in subsection 5.2.2.5.A.1.2.

- **Direct Impacts.** The OPTM (Army's Proposed Action) Alternative would eliminate the permitting issues associated with the CDTF thermal treatment unit by its elimination from the proposed action. The other emission sources would not be impacted by the elimination of the thermal treatment unit.

  Implementation of the OPTM (Army's Proposed Action) Alternative would require additional administrative effort and oversight associated with permitting the fog oil smoke training. The impacts on the air permitting issues with the obscurant training facility would remain consistent with those identified under the RCP Alternative. The reduction of fog oil usage to 84,500 gallons (321,100 liters) per year and a maximum of 1,200 gallons (4,560 liters) per day would still exceed the MDNR permit limitation of 65,000 gallons (247,000 liters) per year and 3,700 pounds (1,665 kilograms) per day. Therefore implementation of this action would require manpower for preparing the permit application and coordination with MDNR.

  The daily amount would exceed the limits set to protect human health as defined by the NAAQS and the Missouri Department of Natural Resources. Therefore there would be a significant adverse impact. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60, located in subsection 5.5.5.

- **Indirect Impacts.** Implementation of the OPTM (Army's Proposed Action) Alternative would require the establishment of environmental programs to administer and monitor the air permits at FLW. Implementation of the additional operating air permits would require long term activities associated with operating, monitoring, record keeping, reporting, and implementing precautions as required by the permits. The level of effort to maintain the permits under the OPTM (Army's Proposed Action) Alternative would be less when compared to the RCP Alternative.

**5.2.2.10.1.3 EPTM Alternative.** The EPTM Alternative does not include a thermal treatment unit at the CDTF. The decontaminated (liquid and solid) waste by-products of toxic agent training that would have passed through the thermal treatment unit will be containerized and shipped to commercial off-post treatment and disposal facilities. The change from the OPTM (Army's Proposed Action) Alternative involves a further reduction in the quantity of fog oil used in the obscurant training program to a volume of 49,500 gallons (188,100 liters) per year, which is within the limit established by the current permit. This training method would however include the use of up to 1,200 gallons (4,560 liters) of fog oil per day, with exceeds the current limit of 3,700 pounds (1,665 kilograms) (481 gallons (1,828 liters)).

- **Direct Impacts.** Implementation of the EPTM alternative would require permit modification to allow completion of training be those associated with permitting the fog oil smoke training.

  The EPTM Alternative would also eliminate the permitting issues associated with the CDTF thermal treatment unit by its elimination from the project. The other emission sources would not be impacted by the thermal treatment unit. The impacts on the air permitting issues with the obscurant training would remain consistent with those identified under the RCP Alternative; however, the reduction of fog oil usage to 49,500 gallons (188,100 liters) per year would be in compliance with the existing MDNR permit limitation of 65,000 gallons (247,000 liters) per year. However, a modification to the construction permit for obscurant training would be required under the EPTM Alternative to increase the daily limit from 3,700 pounds (1,665 kilograms) (481 gallons (1,828 liters)) per day to 1,200 gallons (4,560 liters) per day.

  The daily amount would exceed the limits set to protect human health as defined by the NAAQS and the Missouri Department of Natural Resources. Since these standards are designed to protect human health, there could be a significant adverse effect unless mitigation measures are adopted. A summary of significant adverse impacts and related mitigation activities is provided in Table 5.60, located in subsection 5.5.5.

- **Indirect Impacts.** The indirect impacts with regard to permitting and regulatory authority for implementation of the EPTM Alternative would be associated with the environmental programs established to administer the air permits at FLW. Implementation of the additional operating air permits would require long term activities associated with operating, monitoring, record keeping, reporting, and implementing precautions as required by the permits. These are adverse impacts from the perspective of commitment of resources. The level of effort to maintain the permits under the EPTM Alternative would be less when compared to the RCP Alternative.

**5.2.2.10.2 Issue: *Water Quality Management Permits.*** Some of the activities and equipment associated with the implementation of the BRAC training objectives require FLW to obtain water quality management permits. Most construction will be greater than 5 acres (2 hectares), requiring application for inclusion in the state general stormwater permit. Subsection 5.2.2.5 discusses the water quality issues associated with the implementation of the proposed training objectives at FLW. Fort Leonard Wood has existing point source and non-point source discharges which have been permitted under the NPDES program administered by the state. Under all the training method (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives the following concerns will not be issues impacting water resource management permits:

1) The modification of the existing stormwater permit to include the numerous construction sites of less than 5 acres (2 hectares) in area.

2) The addition of the Military Police School and Chemical School activities will not result in an alteration of the public water supply permit. No new water supply sources or wells will be required to implement the proposed action. Adequate capacity for providing water exists with the existing sources which include well and surface water withdrawal from the Big Piney River.

3) Modification of the NPDES Permit for the waste water treatment plant will not be required since there is adequate treatment capability and capacity for the waste water generated by the proposed action. Expansion of the collection system or the addition of lift stations associated with implementation of the proposed action would not require additional permitting actions.

**5.2.2.10.2.1 RCP Alternative.** The RCP Alternative includes implementation of the following activities associated with the referenced training goals. These activities may potentially generate discharges to surface or ground water which could impact compliance with the existing water quality management permits. The release of uncombusted fuels from FFE deterrents training (TG 1.3) and the use of fog oil for the obscurant training (TG 7.2, TG 7.3, and TG 7.4) are addressed under the revised NPDES Missouri State Operating Permit Number MO-0117251 issued 4 April 1995. This permit was revised by FLW as part of the BRAC evaluation process. It requires monitoring and provides effluent limitations for 12 outfalls which would include all the training areas proposed in the RCP Alternative.

- **Direct Impacts.** The direct, long-term adverse impact resulting from implementation of the RCP Alternative will be the need to monitor the NPDES permitted outfalls for potential runoff from the FFE deterrent training (TG 1.3) and the obscurant (TG 7.2, TG 7.3, and TG 7.4) training areas.

- **Indirect Impacts.** Under the RCP Alternative implementation of the activities would require long term activities associated with operating, monitoring, record keeping, reporting, and implementing precautions as required by the permits. These are adverse impacts from the perspective of commitment of resources.

  Implementation of the following activities associated with the referenced training goals are not expected to create conditions which would require modification of existing permits or need to obtain additional water resource permits. These activities have been addressed under the water quality impacts in subsection 5.2.2.5 and would represent long-term potential indirect impacts on maintaining compliance with the NPDES permit: vehicles crossing streams (TG 1.2, TG 2.1,TG 3.1,TG 7.3, and TG 7.4); potential spills of maintenance oils; fuels, and fluids (TG 2.2, TG 3.2, TG 7.5, and TG 11.3); increased sediment in runoff (TG 1.2, TG 1.8, TG 2.1, TG 3.1, TG 6.2, TG 7.3, TG 7.4, and TG 10.1).

**5.2.2.10.2.2 OPTM (Army's Proposed Action) and EPTM Alternative.**

- **Direct Impacts.** Implementation of the OPTM (Army's Proposed Action) or EPTM Alternative would have essentially the same direct impacts on the issue of water quality management permits as the implementation of the RCP Alternative. This is due to the fact that the activities of concern as identified in the NPDES permit in the monitored basins do not change between the alternatives. The one exception involves obscurant storage training (TG 7.6) which would be conducted under a covered area, thereby preventing precipitation runoff from being contaminated with any spillage. The covered, diked storage area would not need to have an oil/water separator or discharge.

- **Indirect Impacts.** Implementation of the OPTM (Army's Proposed Action) or EPTM Alternatives would have essentially the same indirect impacts on the issue of water quality management permits as the implementation of the RCP Alternative. This is due to the fact that the activities of concern as identified in the NPDES permit in the monitored basins do not change between the alternatives. The one area of lesser potential for indirect impacts on permit compliance is the provision of diked areas for the exterior maintenance training (TG 2.2, 3.2, 7.5, and 11.3). This would control potential releases and therefore eliminate the potential indirect impact on the NPDES outfall monitoring results for these activities.

**5.2.2.10.3 Issue: *Hazardous and Radioactive Materials Management.*** Activities and equipment associated with the BRAC training goals require FLW to obtain and NRC license for radioactive material management. Existing permits and licenses and regulatory compliance are discussed in subsection 4.10. Subsection 5.2.2.8 addresses the issues and impacts relative to hazardous and

radioactive materials management associated with the implementation of the training goals at FLW. Fort Leonard Wood has existing activities which involve a hazardous waste permit and Nuclear Regulatory Commission licenses.

Activities associated with the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives will not result in an alteration of the procedures for management of hazardous waste at FLW. The FLW facility can accommodate the additional generation of hazardous waste under the existing generator identification number. Accumulation of hazardous wastes and temporary storage at the DRMO facility will be managed in accordance with the standard operating procedures currently in use at FLW. These generation, accumulation and less than 90-day storage activities do not require acquisition of a RCRA hazardous waste management facility permit from the state or USEPA. No permitted hazardous waste treatment, storage or disposal (TSD) units are planned as part of the BRAC action.

Activities associated with the RCP, OPTM (Army's Proposed Action) and EPTM alternatives will not result in an alteration of the procedures for management of solid and medical wastes at FLW. The FLW facility can accommodate the additional generation of solid and medical wastes under the Standard Operating Procedures currently in use at FLW. The accumulation of medical wastes at an additional short term storage location will not require acquisition of a medical waste management facility permit from the state.

The remaining regulatory issue of concern is associated with the radioactive materials management. Existing management of radioactive materials at FLW is discussed in subsection 4.8.7. Existing permits and licenses and regulatory compliance are discussed in subsection 4.10. Subsection 5.2.2.8 addresses the issues and impacts relative to radioactive materials management associated with the implementation of the BRAC training goals at FLW. Implementation of the BRAC action would result in a need for an additional NRC Materials License for the management and use of radioactive materials at the Chemical School radiological laboratory and associated areas. The primary focus of all radiological training at the Chemical School is radiation protection and safety.

The use of radiological materials will be associated with the following activities:

- Equipment check sources and low-level laboratory sources for calibration and detection exercises (TG 6.1);
- Nuclear fallout detection and effect determination (TG 6.4);
- Radiation safety equipment usage and response training (TG 8.1); and
- Radiation, test, and operational equipment storage and operation of a decay-in-storage and low level radioactive waste storage facility prior to shipping the materials off site through properly licensed and permitted contractors for treatment storage and/or disposal (TG 8.2). All the radioactive materials used at the Chemical School are commercially produced sources and can be transported through commercial delivery services.

**5.2.2.10.3.1 RCP Alternative.** The RCP Alternative would provide for a radiological laboratory and storage facilities and an alpha field exterior training capability similar to the facilities at FMC. Since the current operation at FMC started in 1980, there has not been a reportable student exposure. The average dose to students has been less than that allowed for the general public and far below that normally received by workers in the commercial industry. Training exercises are designed to get the maximum training benefit with the least radiation exposure. Most of the radioactive material will be small sealed sources used in the laboratory as check sources for radiation meters or laboratory measuring equipment. There will also be some larger sealed sources used for radiation instrument calibration. Small quantities of unsealed radioactive material will be used in the laboratories to train students in how to handle unsealed sources and how to control contamination. These sources will be used in very small quantities, microcurie range, and under very stringent control in the laboratories. The Chemical School obtained approval (in its existing NRC license at FMC) to construct and operate an alpha field training area where they could conduct training with small quantities of unsealed radiological materials. Even though the school is licensed to operate an outdoor alpha field where unsealed radiological materials could be used in training, and one was built at FMC, the field has never been used for training and there are no plans to use the

alpha field in the future. Relocation of the current training practice would include duplication of the never used alpha field at FLW.

- **Direct Impacts.** Possession and use of the quantities and types of radiological materials would require that FLW acquire a NRC Materials License for use and storage of radiological materials at the Chemical School.

- **Indirect Impacts.** Under the RCP Alternative, implementation of the activities requiring a NRC Materials License for use and storage of radiological materials at the Chemical School would require long term activities associated with operating, monitoring, record keeping, reporting and implementing precautions as required by the license and regulations. These are adverse impacts from a commitment or resources perspective but have a benefit of protecting human health and the environment through the monitoring required. The probability of an environmental release is very low. Sources are stored in specially designed containers which maintain their integrity even if the source is involved in a fire. Most of the sources are stored in a specially designed vault to restrict access. Sources are used in the smallest quantity required under the supervision of Chemical School staff trained in radiation protection and safety and in the proper use of the source or device.

**5.2.2.10.3.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** Implementation of the OPTM (Army's Proposed Action) or the EPTM Alternatives would have essentially the same direct and indirect impacts on the issue of radioactive material management licenses as the implementation of the RCP Alternative. The confinement of use of unsealed sources to the radiological laboratory will not alter the need for a license. It would have less potential for impact on the environment as described under subsection 5.2.2.8. The inability to use the alpha field without preparing a future NEPA document and AR 200-2 evaluation renders the RCP Alternative very similar to the OPTM (Army's Proposed Action) and EPTM Alternatives from the perspective of the need for an NRC Materials License.

The training method will remove the ability to perform exterior training with unsealed radiological isotope sources which is currently allowed in the NRC license at FMC. As discussed above, the ability to use unsealed radiological isotope sources in an exterior training environment has never been performed at the FMC alpha field, and there are no plans to implement this type of training at either FMC or FLW. The difference between the RCP Alternative and the OPTM (Army's Proposed Action) and EPTM Alternative is a restriction of training to a greater extent than is currently called for in the existing Nuclear Regulatory Commission (NRC) license at FMC, consequently:

- there are no plans to implement exterior training with unsealed radiological materials;

- the construction of an alpha field has not been requested as part of the BRAC process; and

- the environmental impacts associated with the selection of a training site, construction of the training area, or implementation of this type of training have not been addressed in this EIS.

Should the need arise in the future to implement exterior training with unsealed radiological materials, proper environmental documentation in accordance with NRC License, NEPA and AR 200-2 will be completed by the Army.

## 5.2.2.11 Biological Resources

This subsection examines the potential effects of the alternatives on the biological resources of the installation. As described in Section 3, there are three components of the proposed action including relocation of training missions, provision of associated support facilities, and relocation of the related population. The following paragraphs identify and describe issues relating to relocation of training missions to FLW. The discussion has been divided into five parts: Federal T & E species; Other Protected

Species; Wetlands; Aquatic Resources; and Terrestrial Resources. Only alternatives which present potential impacts are discussed, and no discussion of an alternative in a section means that no potential impacts associated with that alternative were identified. The issues to be discussed under each resource heading are listed at the beginning of each subsection.

As this section is reviewed, the reader may note that the potential human health effects (subsection 5.2.2.15.B.1) from inhalation and ingestion exposures to fog oil and from inhalation of terephthalic acid (TPA) smoke were less pronounced than those determined for T & E species. The primary reasons for these differences are discussed in subsection 5.2.2.11.4.2.

## 5.2.2.11.A Federal Threatened and Endangered (T & E) Species

As required under Section 7 of the Endangered Species Act (ESA, 1973 as Amended), FLW has prepared a Biological Assessment (BA) evaluating the effects of the proposed actions at FLW on federally-endangered Indiana bats and gray bats and federally-threatened bald eagles (FLW, 1997). Because some BRAC actions may affect federally listed species, the Army requested formal Section 7 consultation with the Columbia, Missouri Field Office of the U.S. Fish and Wildlife Service (USFWS). The USFWS reviewed the proposed action, and issued a Biological Opinion (BO; USFWS, 1997), an incidental take statement, terms and conditions for Section 9 exemption, and reasonable and prudent measures (RPMs). The BO addresses only effects to listed species resulting from implementation of the Army's Proposed Action (OPTM CH&I and Phased Population Move) Alternative. The RPMs specified in the BO are formulated to minimize incidental take associated with the Army's Proposed Alternative. Effects associated with the Army's Proposed Alternative, and described below, may be reduced via implementation of RPMs. If an action other than the Army's Proposed Alternative is selected, consultation with the USFWS will conclude in issuance of a BO that addresses the selected alternative. In addition, RPMs may be issued to minimize incidental take associated with the selected alternative. See subsection 5.1.4.3 for additional information on the RPMs.

Under the ESA, *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, track, capture, or collect (or attempt to engage in any such conduct) a species." The definition of *take* has been expanded to include effects to the species resulting from impacts to their habitat. The BO defined conservation measures and determined the likelihood of the proposed action to jeopardize the continued existence of bald eagles, Indiana bats, and gray bats. The *incidental take statement* specifies the level of authorized incidental take, and reasonable and prudent measures to minimize incidental take. The proposed BRAC action will not be conducted without compliance with terms and conditions as stated by the USFWS in the BO.

The Biological Assessment (BA) complies with the Endangered Species Act and 50 CFR Part 402. Unlike an EIS, a BA is not required to address other reasonable alternatives consequently the BA addresses only the Army s Proposed Action. The USFWS used information in the BA in formulation of their Biological Opinion (BO). The BA provided information to be used by the service in issuing their determination of jeopardy or no jeopardy to the continued survival of the three federally listed species. In the BO, USFWS determined that the proposed action will not jeopardize the continued survival of the three federally listed species as a result of the Army s Proposed Action.

Reasonable and Prudent Measures issued with the BRAC BO are designed to minimize incidental take of T & E species. Under the OPTM Alternative, effects to T & E species will be reduced. Fort Leonard Wood is preparing and will implement an Endangered Species Management Plan (ESMP) as required by Army Regulation 200-3 (DA, 1995a). The ESMP will specify measures to balance conservation of bald eagles, Indiana bats, and gray bats, and mission requirements. A primary goal of the ESMP will be to specify a well-designed, integrated approach to endangered species management at FLW.

In addition to meeting these Federal regulations, within 1 year of issuance of the BO, FLW will produce a written Landscape-Scale Forest Management Policy, committing FLW to maintain or enhance forest quality. A goal of the Forest Management Policy is to enhance the ecosystem that supports endangered

Indiana bats and gray bats. The policy will incorporate current and proposed management guidelines (e.g. Bat Management Zones) designed by FLW to conserve endangered species and their habitat on the installation.

Implementation of the planned training objectives at FLW will result in the following issues with respect to Federal T & E species:

- Exposure to sound;
- Exposure to toxicological agents; and
- Exposure to human presence.

As noted in subsection 5.2.2.11.A.2, an ecological risk assessment was prepared for training materials that have the potential to adversely affect T & E species. A similar type of evaluation for fog oil training was conducted for humans as part of a human health preliminary risk evaluation (see 5.2.2.15.B).

**5.2.2.11.A.1 Issue: *Exposure to Sound.*** The RCP, OPTM (Army's Proposed Action) and EPTM Alternatives include implementation of training activities new to FLW, and the relocation of existing training ranges. Assessment of direct and indirect effects of airborne and/or substrate-borne sound resulting from the proposed BRAC action indicated no effect of exposure to sound generated by training on Federal T & E species.

Analyses indicate no direct or indirect effects to T & E species from exposure to sound resulting from proposed Land Use and Facility Plan alternatives. The rationale and methodology used to conduct the analyses are described in the Biological Assessment: Relocation of Military Police School and Chemical School to FLW (FLW, 1997). Assessments to identify effects to endangered species included:

- **Bald Eagle**. Characteristics of sounds reaching locations used by wintering bald eagles were evaluated to determine potential effects of these sounds on the species. Effects of sound resulting from the proposed training mission, including decontamination training (Air Force Base Recovery, NBC Procedures) and mobile smoke training using smoke generators were analyzed. Results indicate no effects from proposed Military Police School and Chemical School training missions on bald eagles (FLW, 1997).

- **Indiana Bat**. Effects of sound resulting from the proposed training mission, including sound generated by new equipment (including pulse-jet and turbine smoke generators), and relocated training activities on Ranges 3, 4 6, 10, Babb Airfield (Air Force Base Recovery), and 16-Building MOUT to hibernating Indiana bats in Brooks, Wolf Den, Joy, and Davis No. 2 caves on FLW were analyzed. Results of laboratory studies using a surrogate species (little brown bat, *Myotis lucifugus*) to assess the response of Indiana bats to stimuli approximating sounds generated by proposed Military Police School and Chemical School training missions indicate there will be no effect of exposure to sounds on hibernating Indiana bats (FLW, 1997).

- **Gray Bat**. Characteristics of sounds reaching caves were evaluated to determine potential effects of these sounds on non-hibernating, roosting gray bats. Impacts to gray bats of sound generated by proposed Military Police School and Chemical School training missions, including mobile smoke training areas at Cannon Range and Bailey/McCann Hollow were assessed. Proposed mobile smoke training areas are approximately 5,740 feet (1,722 meters) from Saltpeter No. 3 Cave, and approximately 7,939 feet (2,382 meters) from Davis No. 2 Cave, respectively. Saltpeter No. 3 Cave houses a maternity colony, while Freeman Cave is used by gray bats during all season except winter (FLW, 1997). Transient gray bat use Davis No. 2 Cave. Analyses showed that sound produced by these and other Military Police School and Chemical School training activities will not affect non-hibernating gray bats at Saltpeter No. 3, Davis No. 2, or Freeman caves (FLW, 1997).

**5.2.2.11.A.2 Issue: *Exposure to Toxicological Agents.*** Military Police School and Chemical School training missions include use of fog oil obscurant, training simulants, terephthalic acid (TPA) smoke pots and grenades, and other training support materials (FLW, 1996f). Training materials which have the potential to adversely affect T & E species are TPA grenades and smoke pots, fog oil (smoke training) and certain expendable training materials. Procedures used to assess effects of TPA, fog oil and expendable training materials under all land use and facility plans are described in subsection 5.2.2.11.A.2.1. An ecological risk assessment was completed to determine potential effects of exposure to fog oil and TPA on T & E species.

An ecological risk assessment was completed following guidance from the following documents:

- Procedural Guidelines for Ecological Risk Assessments at U.S. Army Sites (ERDEC-TR-221);
- Framework for Ecological Risk Assessment (USEPA, 1992a); and
- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (USEPA, 1994).

Following these standard guidelines, a predictive ecological risk assessment was constructed using site specific information when available (COE KC, 1997b). When site specific information was not available, we assumed that, during certain aspects of their natural history, receptors (threatened and endangered species) would be exposed during release of chemicals. These assumptions may overestimate actual exposure and may overestimate adverse effects to receptors .

For example, to determine effects of ingestion of potential toxicants, if a receptor could potentially ingest toxicant exposed prey, but the composition of toxicant exposed prey in the diet could not be conclusively determined, it was assumed the receptor diet was composed exclusively of such prey on days when releases occurred. Again, results based upon these assumptions may be more conservative (more potentially negative) than would likely be the case if exact concentrations of chemicals consumed were known and could be incorporated in analysis.

The ecological risk assessment also applied a conservative approach when using turbulent atmospheric conditions to calculate the receptor exposure concentrations. Exposure concentrations were determined at varying distances from the source, modeled under Pasquill categories B-E. Effects were evaluated at wind speeds, heights, and Pasquill categories resulting in the greatest dispersion and concentration of each potential toxicant (COE KC, 1997b). Because the Pasquill category under which training would occur, as well as the number of times per year that training might occur were unknown, analysis was performed to determine effects for receptor exposure for each Pasquill category at varying distances for each receptor.

The risk assessment approach is used to identify where potential for an effect occurs, but not specifically what those effects are. The approach does not identify conclusively whether or not a predicted (adverse) effect will occur, it identifies if potential for the effect exists. Where the risk assessment identified the potential for a toxicant to have an adverse effect, the toxicant was identified in this document as having an adverse affect.

Literature data identifying the response of test species to laboratory-controlled exposures was used to determine if there is potential for adverse effects to T & E species from exposure to potential toxicants. Effects exhibited by test species may or may not adequately characterize effects likely to be exhibited by T & E species (COE KC, 1997b). Common test species, such as mice, rats, and guinea pigs may demonstrate different effects than would occur in bats or bald eagles with similar exposure histories. Although routes of exposure (inhalation, absorption through the skin, ingestion) are the same between test species and T & E species, the ultimate response to exposure may vary between species. A discussion of effects described for test species exposed to potential toxicants is given in Appendix IV of the BRAC Biological Assessment (FLW, 1997).

For all materials except fog oil, analysis yielded similar effect determinations for all viable training alternatives (including the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives) under each of the Land Use and Facilities Plans (including the Army's Proposed LU & FP (CH&I), Alternative 1 LU & FP (CH), and Alternative 2 LU & FP (SH).

A risk assessment was also conducted to evaluate the potential for human health effects due to exposure to fog oil (subsection 5.2.2.15.B.1). Whereas the ecological risk assessment conducted for threatened and endangered (T & E) and non-T & E species predicted potential adverse impact s from exposure to fog oil, the human health risk assessment did not. The primary reasons for these differences are summarized as follows:

- The duration of exposure for wildlife and T & E species is greater than for humans. Wildlife and T & E species have the potential to spend a large portion of their life in exposure areas. The only humans close enough to the smoke which have the potential to receive fog oil exposures that may exceed health impacting concentrations are those involved in training. Obscurant smoke training events are finite in duration (less than one hour) and are not considered lifetime exposures.

- The T & E and wildlife species exposure assessment assumed fog oil smoke was independent of wind direction.

- T & E and other wildlife species were assumed to carry out their normal life cycle activities at FLW without avoidance of fog oil and TPA smoke plumes. Risk to wildlife species may be overestimated due to assumption that wildlife species do not avoid fog oil and TPA plumes.

- Soldiers involved in fog oil training have the ability to consciously limit exposures by such actions as: 1) conducting training under restricted meteorological conditions designed to limit human exposures outside of training areas to levels which do not pose a health risk; 2) the wearing of respiratory protection by soldiers in training areas where fog oil concentrations may exceed health standards; and 3) positioning themselves upwind of smoke generators during training.

- There is a lack of fog oil toxicity information on wildlife compared to humans and this predicament creates uncertainty when attempting to develop concentrations that are protective of wildlife. To account for this uncertainty, the DOD guidance followed when conducting the ecological risk assessment required that toxicity values found in the literature be decreased to a more protective value to add greater assurance of wildlife protection. Greater reductions were applied for T & E species than for non-T & E species.

### 5.2.2.11.A.2.1 RCP Alternative

**Terephthalic Acid Grenades and Smoke Pots**

- **Bald Eagle.** Wintering bald eagles may travel installation wide, but perch at suitable habitat along Roubidoux Creek and the Big Piney River. Eagles occurring within 9,840 feet (3,000 meters) of any TPA grenade or smoke pot training site have the potential to be adversely affected by single exposure to inhaled TPA. TPA release sites occur less than the 9,840 feet (3,000 meters) distance from suitable bald eagle habitat along Roubidoux Creek and the Big Piney River (TPA grenades, Table 5.17; TPA smoke pots, Table 5.18). Impacts from TPA released during proposed grenade and smoke pot training would affect only wintering bald eagles; there is no anticipated effect of TPA grenade or smoke pot training on nesting bald eagles.

**Table 5.17:**
**Distance Between Terephthalic Acid Grenade Training Locations and Bald Eagle Habitat Where Effects May Occur**

| Grenade Training Location | Distance to Roubidoux Creek | Distance to Big Piney River |
|---|---|---|
| Range 28 | 8,659 FT (2,640 M) | |
| Road | 8,692 FT (2,650 M) | |
| Sapper Training Area | 2,460 FT (750 M) | |
| Training Area 125 | | 5,806 FT (1,770 M) |
| Training Area 126 | | 6,232 FT (1,900 M) |
| Training Area 194 | | 9,643 FT (2,940 M) |
| Training Area 234 | 9,020 FT (2,750 M) | |
| Training Area 240S | 7,609 FT (2,320 M) | |
| Training Area 240N | 5,970 FT (1,820 M) | |
| Training Area 241 | 8,922 FT (2,720 M) | |

Notes: FT = feet
M = meters

*Source: 3D/Environmental*

**Table 5.18:**
**Distance Between Terephthalic Acid Smoke Pot Training Locations and Potential Bald Eagle Habitat Where Effects May Occur**

| Smoke Pot Location | Distance to Roubidoux Creek |
|---|---|
| Bailey/McCann Hollow | 2,699 FT (823 M) |
| Musgrave Hollow | 8,426 FT (2,569 M) |
| Mush Paddle Hollow | 1,945 FT (593 M) |
| Range 28 | 8,669 FT (2,643 M) |
| Babb Airfield | 9,250 FT (2,829 M) |
| Wolf Hollow | 8,790 FT (2,680 M) |

Notes: FT = feet
M = meters

*Source: 3D/Environmental*

- **Indiana Bat.** Indiana bats may forage installation-wide; Indiana bats foraging within 9,840 feet (3,000 meters) of any TPA training site have the potential to be adversely affected by both single and lifetime exposure to inhaled TPA from grenades and smoke pots. In addition, Indiana bats hibernating in Davis No. 2, Joy, Brooks, and Wolf Den caves may be adversely affected by inhalation exposure to TPA released during both TPA grenade (Table 5.19) and TPA smoke pot (Table 5.20) training. Indiana bats hibernating in Great Spirit Cave will not be affected by TPA.

**Table 5.19:**
**Distance Between Terephthalic Acid Grenade Training Locations and Indiana Bat Hibernacula Where Adverse Effects May Occur**

| Terephthalic Acid Grenade Location | Distance to Davis No.2 Cave | Distance to Joy Cave | Distance to Brooks Cave | Distance to Wolf Den Cave |
|---|---|---|---|---|
| Range 33 | | | | 5,543 FT (1,690 M)[1] |
| Road | | | | 3,542 FT (1080 M) |
| Sapper Training Area | 2,657 FT (810 M) | 2,132 FT (650 M) | | |
| Training Area 125 | | | 7,806 FT (2,380 M) | |
| Training Area 194 | | | 6,330 FT (1,930 M) | |
| Training Area 238 | | | | 3,838 FT (1,170 M) |
| Training Area 238B | | | | 9,250 FT (2,820 M) |
| Training Area 243 | | | | 5,970 FT (1,820 M) |

Note: 1 Uses a different location than the one specified in Table 5.20 below
FT = feet
M = meters

*Source: 3D/Environmental*

**Table 5.20:**
**Distance Between Terephthalic Acid Smoke Pot Training Locations and Indiana Bat Hibernacula Where Adverse Effects May Occur**

| Terephthalic Acid Smokepot Location | Distance to Davis No.2 Cave | Distance to Joy Cave | Distance to Wolf Den Cave |
|---|---|---|---|
| Babb Airfield | | | 6,166 FT (1,880 M) |
| Bailey/McCann Hollow | 7,947 FT (2,423 M) | 6,708 FT (2,045 M) | |
| Mush Paddle Hollow | 9,476 FT (2,889 M) | 5,914 FT (1,803 M) | |
| Range 33 | | | 5,527 FT (1,685 M)[1] |

Note: 1 uses a different location than the one specified in Table 5.19 above
FT = feet
M = meters

*Source: 3D/Environmental*

- **Gray Bat.** Gray bats may fly installation-wide; gray bats foraging within 9,840 feet (3,000 meters) of any TPA training site have the potential to be adversely impacted by both single, and lifetime exposure to inhaled TPA from grenades and smoke pots. Gray bats roosting in the maternity colony in Saltpeter No. 3 Cave may potentially exhibit adverse effects from inhalation of TPA released during both TPA grenade (Table 5.21) and TPA smoke pot (Table 5.22) training. Freeman Cave, used by gray bats, is not within 9,840 feet (3,000 meters) of any training area. Therefore, TPA released from training areas will not result in toxic concentrations reaching Freeman Cave. Likewise, Gray bats maternity roosting in Great Spirit Cave will not be affected by TPA.

**Table 5.21:**
**Distance Between Terephthalic Acid Grenade Training Locations and Gray Bat Maternity Cave Where Effects May Occur**

| Grenade Location | Distance to Saltpeter No.3 |
|---|---|
| Sapper Training Area | 558 FT (167 M) |

Note: FT = feet
M = meters

*Source: 3D/Environmental*

**Table 5.22:**
**Distance Between Terephthalic Acid Smoke Pot Training Locations and Gray Bat Maternity Cave Where Effects May Occur**

| Smokepot Location | Distance to Saltpeter No.3 (feet) |
|---|---|
| Bailey/McCann Hollow | 6,914 FT (2,108 M) |
| Mush Paddle Hollow | 5,743 FT (1,751 M) |

Note: FT = feet
M = meters

*Source: 3D/Environmental*

### Expendable Training Materials That May Potentially Affect T & E Species

Certain expendable training materials used in proposed Military Police School and Chemical School training activities are potential toxicants for which a detailed ecological risk assessment was not completed. To address impacts of the use of these materials, a screening process was applied to identify those that have no effect on T & E species. Screening criteria included location of use (e.g. inside a training facility/building), quantity of use, toxicity, and method of use (e.g. contained in a sealed vessel). Expendable training materials for which an adverse effect could not be discounted during this screening analysis may affect bald eagles, Indiana bats, and gray bats (COE KC, 1997b).

Use of these materials are expected to be episodic and at several locations throughout the installation. Effects of training materials will be further assessed in a biomonitoring program to be implemented at FLW. Training materials and activities associated with their use that will be assessed for effects to T & E species are given in Table 5.23. Expendable training materials are proposed for use in all training alternatives under each land use and facility plan alternative, unless otherwise noted.

| Table 5.23:<br>Training Materials That May Affect T & E Species | |
|---|---|
| **Training Material** | **Training Activity** |
| Explosives C4 (MO23 and M024), TNT (M030, M032, and M039), and dynamite (M591) | Mines and Obstacles (TG 1.3) |
| CS (tear gas) capsules | General Military Training<br>NBC Personal Protective Equipment (TG 4.3) |
| Colored smoke grenades<br>(No. 31-36, G930, G940, G945, G950, G955, G963) | Battlefield Procedures<br>Maneuver Operations (TG 1.2)<br>NBC Warning and Reporting (TG 1.4)<br>Urban Terrain (TG 1.7)<br>General Military Training<br>NBC Personal Protective Equipment (TG 4.3)<br>Signals & Other Non-verbal Communication<br>NBC Procedures (TG 4.4)<br>NBC Procedures (TG 6.1)<br>NBC Equipment (TG 6.2)<br>NBC Survival Recovery (TG 6.4)<br>Obscurant Procedures<br>Obscurant, Employment Operations, Basic (Static) (TG 7.2) |
| CS (tear gas) hand grenades | Battlefield Procedures<br>Maneuver Operations (TG 1.2)<br>NBC Warning and Reporting (TG 1.4)<br>Urban Terrain (TG 1.7)<br>General Military Training<br>NBC Personal Protective Equipment (TG 4.3)<br>NBC Procedures<br>NBC Procedures (TG 6.1)<br>NBC Equipment (TG 6.2)<br>NBC Survival Recovery (TG 6.4) |
| Signal illumination<br>(No. 50-59, M127, L305, L306, L307, M59-T137E2, M159-T137E2, M125, L314) | Battlefield Procedures<br>Maneuver Operations (TG 1.2)<br>NBC Warning and Reporting (TG 1.4)<br>Urban Terrain (TG 1.7)<br>General Military Training<br>NBC Personal Protective Equipment (TG 4.3)<br>Signals & Other Non-verbal Communication (EPTM only) (TG 4.4)<br>NBC Procedures<br>NBC Procedures (TG 6.1)<br>NBC Equipment (TG 6.2)<br>NBC Survival Recovery (TG 6.4) |
| *Source: 3D/Environmental* | |

**Fog Oil.** The analysis of potential impacts associated with fog oil training has been performed based upon the amount of fog oil that would be used for each of the three training goals that include the use of fog oil: TG 7.2, Obscurant, Employment Operations Basic (Static); TG 7.3 Obscurant, Employment Proficiency Test (Mobile Operations); and TG 7.4 Obscurant, Employment Proficiency Test (Field Training Exercises).

The chemical composition of different fog oils will vary due primarily to the source of feed oil. This is discussed in subsection 5.5.15.B. To account for this variability, Army manufacturing specifications detailed in the fog oil human health literature review, contained in Appendix D of the preliminary human health risk evaluation (COE KC, 1997c), require manufacturers to conduct and pass certain toxicity tests on the fog oil they manufacture for the Army. One of the tests is an analysis for PAH content in the fog oil while the other two are tests for carcinogenicity and mutagenicity. This required testing program assures greater standardization of fog oil (between and within manufacturers) as measured by toxicity and PAH content. The one common element for all fog oils manufactured for the Army is that they are "severely treated" to significantly reduce or remove toxic PAHs. While some compositional variations are anticipated for the fog oils manufactured, there is considerable research evidence that mineral oils that have been subjected to severe treatment during manufacturing, typically exhibit low toxicity.

Fog oils manufactured before 1986 typically had high concentrations of toxic and carcinogenic aromatics (Katz, 1980), and posed a potential health threat to exposed individuals. In 1986, military specifications for SGF-2, were altered to require manufacturers to remove carcinogens and potential carcinogens from the oil (DA, 1986a). Fog oil used at FLW will, at a minimum, comply with a newer specification (DA, 1995b) which requires manufacturers to certify the oils they produce show no evidence of carcinogenicity based on required testing. Carcinogenicity of the oil is attributed to its polynuclear aromatic hydrocarbon (PAHs) constituents. Also, the noncarcinogenic dermal toxicity of petroleum derived fuels and mineral oils are mostly attributable to the aromatic fraction (includes PAH) as opposed to the aliphatic fraction (Neff, 1979; and ATSDR, 1995).

Potential effects of the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives on bald eagles, Indiana bats, and gray bats were analyzed for single exposure and lifetime exposure to static and mobile fog oil (smoke) training (including field training exercises) under each proposed land use and facility plan alternative. Quantities and types of fog oil generators used in training were the same for the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives. However, as discussed in subsection 5.2.2.5.A.1, the amount of fog oil released during obscurant training under the RCP Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 125,500 gallons (476,900 liters) per year.

Proposed training locations and amounts of fog oil used at each location vary under the different alternative land use and facility plans. The alternative locations are listed on Table 5.24 and illustrated on Figure 5.5. The amount of fog oil used at each smoke training location will vary depending on meteorological conditions, training objectives and schedules, time of day and year, compliance with permits, and avoidance of impact to T & E species and other wildlife species. Table 5.25 provides the maximum amounts of fog oil that would be used annually at static and mobile training locations. Effects to T & E Species were assessed assuming individuals would be exposed to a proportion of the yearly quantity of fog oil (Table 5.25) expected (FLW, 1997) to be used at each training area.

**Table 5.24:**
**Fog Oil Training Locations for Land Use and Facility Plan Alternatives**

| Training Activity | Army's Proposed LU & FP (CH&I) | Alternative 1 LU & FP (CH) | Alternative 2 LU & FP (SH) |
|---|---|---|---|
| Static Smoke | Range 30F | Range 29 | Range 30 |
| Mobile Smoke | Ballard Hollow<br>Bailey/McCann Hollow<br>Musgrave Hollow<br>Cannon Range (Mush Paddle Hollow) | Ballard Hollow<br>Musgrave Hollow<br>Wolf Hollow<br>Babb Airfield | Bailey/McCann Hollow<br>Musgrave Hollow<br>Babb Airfield<br>Wolf Hollow |

*Source: 3D/Environmental*

| Table 5.25: Number of Gallons of Fog Oil Used Annually at Static and Mobile Training Sites for Training Alternatives | | | |
|---|---|---|---|
| **Training Location** | **RCP Alternative** | **OPTM Alternative** | **EPTM Alternative** |
| Static Ranges | 20,000 | 8,500 | 1,000 |
| Mobile Ranges | 105,500 | 76,000 | 48,500 |
| *Source: 3D/Environmental* | | | |

**Fog Oil - Static Smoke Training.** Static smoke training under the RCP Alternative will include the use of up to 20,000 gallons (76,000 liters) per year.

- **Bald Eagle.** No effect.

- **Indiana Bat.** Indiana bats that forage and/or roost, during summer, within 16,142 feet (4,920 meters) of a static smoke training area during fog oil release may be adversely affected by inhaled fog oil. Indiana bats that hibernate throughout their life in Davis No. 2, Wolf Den, and/or Joy cave may also be negatively affected by inhaled fog oil. Indiana bats hibernating in Great Spirit Cave will not be affected by static smoke training (TG 7.2).

- **Gray Bat.** Gray bats that forage within 16,142 feet (4,920 meters) of a static smoke training area during fog oil release may be negatively affected by inhaled fog oil. Gray bats that roost each year in the maternity colony in Saltpeter No. 3 Cave may also inhale concentrations of fog oil from static training locations that result in adverse effects. There are no adverse effects to gray bats associated with static smoke training (TG 7.2) near Freeman Cave or Great Spirit Cave.

**Fog Oil - Mobile Smoke Training.** Under the RCP Alternative TG 7.3 Obscurant, Employment Operations, Mobile will result in the use of up to 41,500 gallons (157,700 liters) per year. The fog oil used for TG 7.4 Obscurant, Employment Operations (Field Training Exercises) has also been included in this portion of the analysis, since this training will be conducted at the same locations used for TG 7.3. Field Training Exercises (TG 7.4) will use up to 64,000 gallons (243,200 liters) per year. Consequently under the RCP Alternative a total of up to 105,500 gallons (400,900 liters) of fog oil will be used at the training areas specified for obscurant training.

- **Bald Eagle.** No effect.

- **Indiana Bat.** Indiana bats that forage and/or roost, during summer, within 32,808 feet (10.0 kilometers) of a mobile smoke training area, during fog oil release, may inhale concentrations of fog oil that cause an adverse effect. Indiana bats hibernating each winter in caves (specified below) may be adversely affected by inhaling fog oil from proximate training areas. Table 5.26 summarizes hibernacula where Indiana bats may be adversely affected by inhaling fog oil deployed from various mobile smoke training areas. Hibernacula potentially affected by training by the RCP Alternative under each Land Use Plan are shown. Indiana bats hibernating in Great Spirit Cave will not be affected by mobile smoke training (TG 7.3 and TG 7.4).

**Table 5.26:**
**Indiana Bat Hibernacula Adversely Affected Fog Oil Training Under RCP Alternative**

| Indiana Bat Hibernacula | Army's Proposed LU & FP (CH&I) | Alternative 1 LU & FP (CH) | Alternative 2 (LU & FP (SH) |
|---|---|---|---|
| Davis No. 2 | Cannon Range (Mush Paddle Hollow), and Bailey/McCann Hollow | Babb Airfield | Bailey/McCann Hollow |
| Joy | Cannon Range (Mush Paddle Hollow), and Bailey/McCann Hollow | Babb Airfield | Babb Airfield, and Bailey/McCann Hollow |
| Wolf Den | Bailey/McCann Hollow | Babb Airfield | Bailey McCann Hollow and Babb Airfield |

*Source: 3D/Environmental*

- **Gray Bat.** Gray bats flying within 22,966 feet (7.0 kilometers) of any mobile smoke training location, during fog oil release, may be negatively affected by inhaled fog oil. Gray bats roosting each year in the maternity colony in Saltpeter No. 3 Cave may be adversely affected by inhaling fog oil from proximate mobile fog oil training locations. Table 5.27 summarizes gray bat maternity colonies that may be affected by long-term inhalation of fog oil from various mobile smoke training areas. Gray bats in Freeman Cave or Great Spirit Cave will not be affected by mobile smoke training (TG 7.3 and TG 7.4). Training locations associated with potential adverse effects are shown for each Land Use and Facility Plan under the RCP Alternative.

**Table 5.27:**
**Gray Bat Maternity Colonies Affected by Fog Oil Training Under the RCP Alternative**

| Gray Bat Maternity colony | Army's Proposed LU & FP (CH&I) | Alternative 1 LU & FP (CH) | Alternative 2 LU & FP (SH) |
|---|---|---|---|
| Saltpeter No. 3 | Cannon Range (Mush Paddle Hollow), Musgrave Hollow and Bailey/McCann Hollow | Musgrave Hollow, and Babb Airfield | Bailey/McCann Hollow, Musgrave Hollow, and Babb Airfield |

*Source: 3D/Environmental*

**5.2.2.11.A.2.2 OPTM (Army's Proposed Action) Alternative.** Implementation of the OPTM (Army's Proposed Action) Alternative will not modify the anticipated impact, when compared to the RCP Alternative as discussed in subsection 5.2.2.11.A.2.1, on T & E species from the use of the following:

- Terephthalic Acid; and
- Expendable Training Materials.

**Fog oil.** The amount of fog oil used during obscurant training under the OPTM (Army's Proposed Action) Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 84,500 gallons (321,100 liters) per year as discussed in subsection 5.2.2.5.A.1.2. The following analysis is based on considering the impacts of static training as one analysis, while the impacts of mobile and field training exercises will be considered under a separate analysis step. This process has been used to determine impacts of fog oil usage at individual training locations.

**Fog Oil - Static Smoke Training.** Static smoke training under the OPTM (Army's Proposed Action) Alternative will include the use of up to 8,500 gallons per year.

- **Bald Eagle.** No effect.

- **Indiana Bat.** Indiana bats that forage and/or roost during summer within 12,913 feet (3,936 meters) of a static smoke training area, during fog oil release, may be adversely affected by inhaled fog oil. Indiana bats that hibernate throughout their life in Davis No. 2 Cave may also be negatively affected by inhaled fog oil.

- **Gray Bat.** Gray bats that forage within 12,913 feet (3,936 meters) of a static smoke training area, during fog oil release, may be negatively affected by inhaled fog oil. Gray bats that roost each year in the maternity colony in Saltpeter No. 3 Cave may also inhale concentrations of fog oil from static training locations that result in adverse effects. Gray bats in Freeman Cave or Great Spirit Cave will not be affected by static smoke training (TG 7.2).

**Fog Oil - Mobile Smoke Training.** As discussed in subsection 5.2.2.11.A.2.1 above the analysis of impacts from mobile smoke training will include the anticipated impacts of TG 7.3 Obscurant, Employment Operations, Mobile and TG 7.4 Obscurant, Employment Operations (Field Training Exercises). These TGs have been included in the same analysis as they will use the same training areas. Under the OPTM (Army's Proposed Action) Alternative implementation of planned training for TG 7.3 Obscurant, Employment Operations, Mobile will result in the use of up to 20,000 gallons (76,000 liters) per year. The fog oil used for TG 7.4 Obscurant, Employment Operations (Field Training Exercises) will amount to up to 56,000 gallons (212,800 liters) per year. Consequently under the OPTM (Army's Proposed Action) Alternative a total of up to 76,000 gallons (288,800 liters) of fog oil will be used at the training areas specified for obscurant training.

- **Bald Eagle.** No effect.

- **Indiana Bat.** Indiana bats that forage and/or roost during summer within 22,966 feet (7,000 meters) of a mobile smoke training area may inhale concentrations of fog oil be adversely affected. Indiana bats hibernating each winter in caves (specified below) may be adversely affected by inhaling fog oil from proximate training areas. Table 5.28 provides a summary of hibernacula where Indiana bats may be adversely affected by inhaling fog oil deployed from various mobile smoke training areas. Hibernacula potentially affected by training for the OPTM (Army's Proposed Action) Alternative under each Land Use and Facility Plan. Indiana bats hibernating in Great Spirit Cave will not be affected by mobile smoke training (TG 7.3 and TG 7.4).

**Table 5.28:**
**Possible Fog Oil Impacts to Indiana Bat Hibernacula Under the OPTM (Army's Proposed Action) Alternative**

| Indiana Bat Hibernacula | Army's Proposed LU & FP (CH&I) | Alternative 1 LU & FP (CH) | Alternative 2 LU & FP (SH) |
|---|---|---|---|
| Davis No. 2 | Cannon Range (Mush Paddle Hollow), and Bailey/McCann Hollow | Babb Airfield | Bailey/McCann Hollow, and Babb Airfield |
| Wolf Den | Bailey/McCann Hollow | Babb Airfield | Bailey/McCann Hollow, Babb Airfield |
| Joy | Cannon Range (Mush Paddle Hollow), and Bailey/McCann Hollow | Babb Airfield | Babb Airfield, and Bailey/McCann Hollow |

*Source: 3D/Environmental*

- **Gray Bat.** Gray bats foraging within 22,966 feet (7,000 meters) of any mobile smoke training location, during fog oil release, may be negatively affected by inhaled fog oil. Gray bats roosting each year in the maternity colony in Saltpeter No. 3 Cave may be adversely affected

by inhaling fog oil from proximate mobile fog oil training locations. Gray bats in Freeman Cave or Great Spirit Cave will not be affected by mobile smoke training (TG 7.3 and TG 7.4). Table 5.29 provides a summary of gray bat maternity colonies that may be affected by long-term inhalation of fog oil from various mobile smoke training areas. Training locations associated with potential adverse effects are shown for each Land Use and Facility Plan under the OPTM (Army's Proposed Action) Alternative.

**Table 5.29:**
**Possible Fog Oil Impacts to Gray Bat Maternity Colony from Fog Oil Training Under the OPTM (Army's Proposed Action) Alternative**

| Gray Bat Maternity Colony | Army's Proposed LU & FP (CH&I) | Alternative 1 LU & FP (CH) | Alternative 2 LU & FP (SH) |
|---|---|---|---|
| Saltpeter No. 3 | Cannon Range (Mush Paddle Hollow), Musgrave Hollow and Bailey/McCann Hollow | Musgrave Hollow and Babb Airfield | Bailey/McCann Hollow, Musgrave Hollow, and Babb Airfield |

*Source: 3D/Environmental*

**5.2.2.11.A.2.3 EPTM Alternative.** Implementation of the EPTM Alternative will not modify the anticipated impact, when compared to the RCP Alternative as discussed in subsection 5.2.2.11.A.2.1, on T & E species from the use of the following:

- Terephthalic Acid; and
- Expendable Training Materials.

**Fog Oil**

**Fog Oil - Static Smoke Training.** Static smoke training under the EPTM Alternative will include the use of up to 1,000 gallons (3,800 liters) per year.

- **Bald Eagle.** No effect.
- **Indiana Bat.** No effect.
- **Gray Bat.** No effect.

**Fog Oil - Mobile Smoke Training.** As discussed in subsection 5.2.2.11.A.2.1 above the analysis of impacts from mobile smoke training will include the anticipated impacts of TG 7.3 Obscurant, Employment Operations, Mobile and TG 7.4 Obscurant, Employment Operations (Field Training Exercises). These TGs have been included in one analysis as they will use the same training areas. Under the EPTM Alternative implementation of planned training for TG 7.3 Obscurant, Employment Operations, Mobile will result in the use of up to 20,000 gallons (76,000 liters) per year. The fog oil used for TG 7.4 Obscurant, Employment Operations (Field Training Exercises) will amount to up to 28,500 gallons (108,300 liters) per year. Consequently under the EPTM Alternative a total of up to 48,500 gallons (14,550 liters) of fog oil will be used at the training areas specified for obscurant training.

- **Bald Eagle.** No effect.
- **Indiana Bat.** Indiana bats that forage and/or roost, during summer, within 13,123 feet (4,000 meters) of a mobile smoke training area, during fog oil release, may be adversely affected by inhaled fog oil. Indiana bats that hibernate throughout their life in Davis No. 2, Wolf Den, and/or Joy caves may also be negatively affected by inhaled fog oil. Table 5.30 provides a

summary of hibernacula where Indiana bats may be adversely affected by inhaling fog oil deployed from various mobile smoke training areas. Indiana bats hibernating in Great Spirit Cave will not be affected by mobile smoke training (TG 7.3 and TG 7.4).

- **Gray Bat.** Gray bats foraging within 13,123 feet (4,000 meters) of mobile smoke training areas, during fog oil release, may be adversely affected by inhaled fog oil. Gray bats roosting in the maternity colonies in Great Spirit Cave and Saltpeter No. 3 Cave may be adversely affected by inhaling fog oil from proximate mobile fog oil training locations. Gray bats in Freeman Cave will not be affected by mobile smoke training (TG 7.3 and TG 7.4). Table 5.31 provides a summary of the gray bat maternity colony that may be adversely affected by long-term inhalation of fog oil from various mobile smoke training areas. Training locations associated with potential adverse effects are shown for each Land Use and Facility Plan Alternatives under the EPTM Alternative.

**Table 5.30:**
**Indiana Bat Hibernacula That May Be Affected by Fog Oil Training Under the EPTM Alternative**

| Indiana Bat Hibernacula | Army's Proposed LU & FP (CH&I) | Alternative 1 LU & FP (CH) | Alternative 2 LU & FP (SH) |
|---|---|---|---|
| Davis No. 2 | Cannon Range (Mush Paddle Hollow), and Bailey/McCann Hollow | Babb Airfield | Bailey/McCann Hollow and Babb Airfield |
| Joy | Cannon Range (Mush Paddle Hollow), and Bailey McCann Hollow | Babb Airfield | Musgrave Hollow, Babb Airfield, and Bailey McCann Hollow |
| Wolf Den | Bailey/McCann Hollow | Bailey/McCann Hollow, Babb Airfield, and Wolf Hollow | Bailey/McCann Hollow, Babb Airfield, and Wolf Hollow |

*Source: 3D/Environmental*

**Table 5.31:**
**Gray Bat Maternity Colony That May Be Affected by Fog Oil Training Under the EPTM Alternative**

| Gray Bat Maternity Colony | Army's Proposed LU & FP (CH&I) | Alternative 1 LU & FP (CH) | Alternative 2 LU & FP (SH) |
|---|---|---|---|
| Saltpeter No. 3 | Cannon Range (Mush Paddle Hollow), Musgrave Hollow and Bailey McCann Hollow | Musgrave Hollow and Babb Airfield | Bailey/McCann Hollow, Musgrave Hollow, and Babb Airfield |

*Source: 3D/Environmental*

Effects of fog oil on T & E species, for each training alternative in association with each land use and facility plan are summarized in Tables 5.32 and 5.33. There are no effects to bald eagles from fog oil training.

Effect determinations for Indiana bats (foraging installation-wide and hibernating within Brooks, Wolf Den, Davis No. 2, and Joy caves) are given in Table 5.32.

Table 5.33 provides a summary of potential effects to gray bats (hibernating, maternity or foraging/roosting) of lifetime exposure to fog oil training, including the maximum distance between training area and point of exposure that may lead to an effect are given for alternative Land Use Plans under each training method (RCP, OPTM (Army's Proposed Action) and EPTM) alternative.

**Table 5.32:**
**Summary of Location or Maximum Distance (in Feet) of Potential Fog Oil Effects to Indiana Bats**

| | | | Army's Proposed LU & FP (CH&I) | | | Alternative 1 LU & FP (CH) | | | Alternative 2 LU & FP (SH) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Training** | **Activity** | **Effect** | **RCP** | **OPTM** | **EPTM** | **RCP** | **OPTM** | **EPTM** | **RCP** | **OPTM** | **EPTM** |
| Static | Foraging Roosting | Inhalation | 16,142 | 12,913 | n/a | 16,142 | 12,913 | n/a | 16,142 | 12,913 | n/a |
| Static | Hibernating | Inhalation | n/a | n/a | n/a | D2, WD & J | n/a | n/a | D2 | n/a | n/a |
| Mobile | Foraging Roosting | Inhalation | 32,808 | 22,966 | 13,123 | 32,808 | 22,966 | 13,123 | 32,808 | 22,966 | 13,123 |
| Mobile | Hibernating | Inhalation | see Table 5.26 | see Table 5.28 | see Table 5.30 | see Table 5.26 | see Table 5.28 | see Table 5.30 | see Table 5.26 | see Table 5.28 | see Table 5.30 |

Notes: D2 Davis No. 2 Cave
WD Wolf Den Cave
J Joy Cave
n/a no effect at predicted exposure concentrations

*Source: 3D/Environmental*

**Table 5.33:**
**Summary of Location or Maximum Distance (in Feet) of Potential Fog Oil Effects to Gray Bats**

| | | | Army's Proposed LU & FP (CH&I) | | | Alternative 1 LU & FP (CH) | | | Alternative 2 LU & FP (SH) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Training** | **Activity** | **Effect** | **RCP** | **OPTM** | **EPTM** | **RCP** | **OPTM** | **EPTM** | **RCP** | **OPTM** | **EPTM** |
| Static | Foraging/ Roosting | Inhalation | 16,142 | 12,913 | n/a | 16,142 | 12,913 | n/a | 16,142 | 12,913 | n/a |
| Static | Hibernating | Inhalation | n/a | n/a | n/a | SP | n/a | n/a | SP | n/a | n/a |
| Mobile | Foraging/ Roosting | Inhalation | 22,966 | 22,966 | 13,123 | 22,966 | 22,966 | 13,123 | 22,966 | 22,966 | 13,123 |
| Mobile | Hibernating | Inhalation | see Table 5.27 | see Table 5.29 | see Table 5.31 | see Table 5.27 | see Table 5.29 | see Table 5.31 | see Table 5.27 | see Table 5.29 | see Table 5.31 |

Note: SP Saltpeter No. 3 Cave
n/a no effect at predicted exposure concentrations

*Source: 3D/Environmental*

**5.2.2.11.A.3 Issue: *Exposure to Human Presence.*** Implementation of BRAC-related training will require human activities at both new and relocated training locations. Effects of disturbance to T & E species from these activities were considered. Analyses indicate no direct or indirect effects to T & E species from human disturbance of the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives under any of the Land Use and Facility Plan Alternatives.

Implementation of any of three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW. Fort Leonard Wood proposes certain management practices to avoid adverse effects to T & E species from human disturbance associated with proposed training activities. Project design features described in this subsection are part of the proposed action. Rationale and

methodology for analyses of effects of human disturbance, as well as project design features proposed to avoid adverse effects, are described in the BRAC BA (FLW, 1997).

- **Bald Eagle.** Bald eagles are sensitive to human disturbance, particularly foot traffic. However, proposed training alternatives occur beyond the distance from suitable bald eagle habitat that is associated with adverse effects from human disturbance (FLW, 1997).

- **Indiana Bat.** Effects of human disturbance to Indiana bats at hibernacula will be avoided through management practices near caves used by this species (FLW 1996e).

- **Gray Bat.** Effects of human disturbance to gray bats at maternity and transient roosts will be avoided through management practices near caves used by this species (FLW, 1996e; and FLW, 1997).

## 5.2.2.11.B Other Protected Species

Other protected species (OPS) include state-listed species of birds, mammals, and amphibians as well as migratory birds including NTMs, raptors, and shorebirds. Potential impacts to state-listed species that occur in aquatic habitats are discussed in subsection 5.2.2.11.D, and possible impacts to plants are discussed in subsection 5.2.2.11.E. No density estimates for individual species populations are available for FLW. Since the other protected species resource group includes neotropical migrants, raptors, and other state-listed species, it would be cost prohibitive to try to conduct the exhaustive surveys necessary to assess the populations for each potentially affected species. Consequently, it was assumed that the species populations are evenly distributed across the installation. This assumption is consistent with the same assumption used in the Ecological Risk Assessment (COE KC, 1997b).

Selection of the receptors that were used in an ERA is one of the important stages of an ERA. The receptors are assessment endpoints, which are ecological values that are to be protected. Assessment of risks to appropriately selected receptors will adequately characterize risks, and provide information useful in managing risks. The USEPA presents three potential criteria to use when selecting assessment endpoints for any ERA: ecological relevance, susceptibility to the known or potential stressors, and representation of management goals. An endpoint has ecological relevance if it helps sustain natural structure, function, or biodiversity of an ecosystem.

The ERAs, performed as a part of the EIS analysis, considered sensitive life cycles for both endangered and threatened species, and for birds, reptiles, and amphibians. Results of these studies were similar to findings for adults of each species studied. Risk tables were developed for the species and life stages. The level of impact for evaluation of impacts to threatened and endangered species in the BO (FLW, 1996e) was to the individual animal or species. The level of impact for evaluation of impacts to other species was to the entire species population. Due to the size of the species' populations, the extensive ranges of the species, and the size and diversity of FLW, the proposed action will not threaten the existence of any species.

The threatened or endangered species used in the biological assessment (to which the ERA is Appendix VI) (FLW, 1996e) were selected base upon there presence in the area proximate to locations potentially impacted by the proposed action. Species specifically evaluated in the ERA for birds, reptiles, and amphibians (COE KC, 1997b) were chosen for:

- their physiological and behavioral similarity to species at FLW;
- the availability of information to assist in estimating exposure (habitat preference, reproductive biology, population density, diet diversity, and other life history characteristics); and
- a geographic distribution that includes FLW and Fort McClellan.

All of the species evaluated were chosen in coordination with the USFWS. The species assessed in the ERAs were evaluated for potential impacts, and similar impacts are anticipated for species mentioned in

scoping. Raptors and neotropical migrants were considered during the evaluation of impacts to other protected species. Impacts to individual species, such as specific raptor species or specific neotropical migrant species, are not discussed due to the large number of species that are included in this resource group. The species evaluated in the ERAs with their various life stages are listed below.

- Threatened or Endangered species:
  1) bald eagles - egg; hatchling; juvenile; and adult;
  2) Indiana bats - nursing pup; supplemental nursing pup; and adult; and
  3) gray bats - nursing pup; supplemental nursing pup; and adult.

- Non-endangered species:
  1) amphibian (green frog) - egg; tadpole; and adult;
  2) reptile (eastern yellowbelly racer) - egg; hatchling/juvenile; and adult;
  3) non-raptor bird (northern bobwhite) - egg; hatchling; poult; and adult; and
  4) neotropical migrant (American robin) - egg; hatchling; juvenile; and adult.

The following discussion provides a summary of the reasons for the selection of the non-endangered species for each of the four categories of species reviewed. Additional information concerning the selection of these species along with a discussion as to why other species were not selected is located in the ERA (COE KC, 1997b).

- **Amphibian.** The green frog was selected as the representative amphibian because of its widespread distribution and behavioral biology (which allow realistic maximum exposure assumptions). There are approximately 25 amphibian species on FLW, of which eight (32 percent) are frogs. The green frog spends time in both aquatic and terrestrial environments. They feed on terrestrial organisms (i.e. beetles) on land or along shorelines of permanent to semi-permanent water sources, and they occupy a wide range of habitats. They have two nonadult life cycle stages and undergo metamorphosis.

- **Reptile.** The eastern yellowbelly racer was selected as the most representative reptile. There are 45 species of reptiles on FLW of which 24 are snakes (53 percent of the total reptiles). Racers are very common and are one of the largest terrestrial snakes in the US. They occupy a wide variety of habitats, from open fields to pine flatwoods. Racers have a very diverse diet and are dietary generalists. Compared to other reptiles and snakes, racers have a greater potential for exposure because of their large surface area, preference of open habitats (fields), consumption of terrestrial prey, and activity levels.

- **Non-raptor Bird.** The northern bobwhite was selected to represent avian species which consume surface prey. This species also represents birds which forage on both plants and invertebrates. The northern bobwhite is a gallinaceous bird and are common year-round residents on FLW. Based on their feeding habits, preference for open terrestrial habitats, and their ground dwelling behavior, northern bobwhites were assumed to be a representative bird species. Although using this receptor may overestimate risks to some species that have less potential for exposure, increased exposure may compensate for unidentified sensitivities other species may have to fog oil.

- **Neotropical Migrant.** The American robin was selected as a representative neotropical migrant, because its range is widespread, it lives in many habitats, it regularly consumes a variety of terrestrial food sources (seeds, worms, and insects), and some robins only migrate locally (i.e. may have increased exposure relative to other neotropical migrants). Their exposure duration was considered to be equal to their lifespan. While some individuals may not be exposed for this length of time because they have migrated off the installation, others are year-round residents and could receive maximal exposures. To be protective of all neotropical migrants (i.e. overestimate rather than underestimate risks), the maximum exposure duration possible was assumed.

Implementation of the planned training objectives at FLW will result in the following issues with respect to OPS:

- Vehicle operations on training and maneuver areas;
- Release of unburned fuels from FFE deterrents training;
- Use of chemical simulants, radiological isotopes, and biological simulants; and
- Release of fog oil obscurant.

**5.2.2.11.B.1 Issue: *Vehicle Operations on Training and Maneuver Areas.*** Field maneuver training, vehicle operations, and operation of live fire ranges have the potential to increase localized noise levels, increase the amount of human activity, impact air quality, contaminate soils, and degrade OPS habitat. The TGs related to this issue are: TG 1.2 Maneuver Operations; TG 1.8 Warfighting and Tactical Operation; TG 2.1 BIDS Employment and Operation; TG 3.1 FOX Battlefield Employment and Operation; TG 6.2 NBC Equipment; TG 7.3 Mobile Obscurant Employment Operations; TG 7.4 Field Training Obscurant Employment Operations; and TG 10.1 Weapons Training. Increased noise levels and the increased presence of people and equipment on training areas and ranges could disturb OPS and cause areas to be temporarily abandoned which may increase stress levels. These disturbances could inhibit mating, breeding, nesting, and feeding/foraging behavior. Vehicle emissions and dust could cause respiratory problems. Other protected species' habitats could be destroyed or altered by off-road vehicle use.

**5.2.2.11.B.1.1 RCP Alternative**

- **Indirect Impacts** There will be minor long-term indirect adverse impacts to OPS from vehicle operations associated with training and maneuver areas. Since the overall range activities are expected to be similar to FY 1990 levels, the majority of the impacts should be consistent with past training activities, and no significant impacts are anticipated for OPS. The impacts are discussed in subsection 5.2.2.11.B.1.

  Under the RCP Alternative, hasty decon training will involve washing vehicles to simulate field vehicle decontamination procedures. Antifreeze will be applied to the vehicle, and, using water from a permanent source such as a pond or creek, the antifreeze is washed off of the vehicles. Antifreeze has traditionally been used for this training because of its physical characteristics which allow it to stay on the vehicles more effectively than water. Antifreeze will also react with the M-8/M-9 paper used to locate contaminates prior to decontamination training and to test the decontaminated surfaces after training to ensure that the decontamination process was effective. Water alone will not react with the M-8/M-9 paper, thereby reducing the overall effectiveness of the training. By washing the vehicles in this manner, the antifreeze and vehicle POLs may degrade OPS habitat or enter installation surface waters, especially at the decon sites, and adversely affect aquatic species. The increased disturbance around surface waters may adversely affect migratory birds such as ducks, wading birds, and shorebirds. Under the Army's Proposed LU & FP (CH&I), hasty decon training will occur at the following sites: Babb Airfield pond; Penn's Pond (north); Penn's Pond (south); pond south of Training Area 243; pond at Training Area 238; and a pond in McCann Hollow. Each of these sites is located within collection areas that will be monitored.

**5.2.2.11.B.1.2 OPTM (Army's Proposed Action) and EPTM Alternatives**

- **Indirect Impacts** There will be minor long-term indirect adverse impacts to OPS from vehicle operations associated with training and maneuver operations. The impacts will be the same as discussed in subsection 5.2.2.11.B.1. except for the hasty decon training.

  Under the OPTM (Army's Proposed Action) and EPTM Alternatives, hasty decon training will involve washing vehicles to simulate field vehicle decontamination procedures. However, instead of antifreeze being applied to the vehicle, polyethylene glycol (PEG 200), which has very low toxicity, will be applied to simulate chemical contaminants. Additional information concerning the

physical characteristics of PEG 200 is located in Volume III, Appendix B, subsection B.2.12.2.14. PEG 200, like antifreeze, offers the required physical characteristics which allow it to say on the vehicles more effectively than water, and the PEG 200 will also react with the M-8/M-9 paper used in the training. Since no antifreeze will be applied to the vehicle before washing, there will be less potential impact to OPS habitat from the OPTM (Army's Proposed Action) and the EPTM Alternatives. However, vehicle POLs may enter installation surface waters and adversely affect OPS habitat. Possible adverse impacts from increased disturbance will also remain. Under the Army's Proposed LU & FP (CH&I), hasty decon training will occur at the same sites listed in the RCP Alternative, each of the sites are located within collection areas that will be monitored.

### 5.2.2.11.B.2 Issue: *Release of Unburned Fuels from FFE deterrents Training.*

There is a concern that FFE deterrents training will harm OPS by impacting air quality, destroying OPS habitat, and contaminating surface waters. The TG related to this issue is TG 1.3 Mines and Obstacles.

As a residual of the FFE deterrents training, unburned fuel will be scattered over the soil surface, and during the wall of flame portion of the FFE deterrents training, unburned fuels may seep into the soil. The explosion of fuels will also displace soil and kill vegetation. The unburned fuel could damage or kill vegetation which would increase the likelihood of soil erosion. The unburned fuels and eroded sediment may be carried off-site or into installation waters during storm events which could adversely impact OPS habitat.

Under the Army's Proposed LU & FP (CH&I) all FFE deterrents training will occur specifically on Range 27A which is in the Roubidoux Creek watershed. Since all of the FFE deterrents training will be in a single range area, in an area of approximately 20 acres, the impacts to OPS will be localized.

**5.2.2.11.B.2.1 RCP Alternative.** As discussed in subsection 5.2.2.5.A.5.1 above, FFE deterrents training will use approximately 900 gallons (3,420 liters) of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 2,870 gallons (10,906 liters) of unburned fuel per year.

- **Indirect Impacts** There is a potential for long-term indirect adverse impacts to OPS from the unburned fuels, emissions, and noise associated with FFE deterrents training.

**5.2.2.11.B.2.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM Alternatives would result in smaller impacts than those associated with the RCP Alternative. The degree of the impacts would be lessened as a result of the smaller amount of fuel used (550 gallons (2,090 liters) per training cycle vs 900 gallons (3,420 liters) for the RCP Alternative). As discussed in subsection 5.2.2.5.A.5.2 above, FFE deterrents training will use approximately 550 gallons of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 1,845 gallons (553.5 liters) of unburned fuel on the soil per year. In addition, as discussed in subsection 5.1.4.2, Training Activity Environmental Controls, the design of the training area will include:

1) the construction of a protective barrier under the expedient wall-of-flame training area to reduce the potential for unburned fuel to contaminate surface or groundwater;

2) construction of earthen berms around the entire FFE deterrents training site to prevent upstream surface water from entering the training area; and

3) the construction of clay-lined collection ponds to gather and hold runoff that occurs within the bermed FFE deterrents training area.

- **Indirect Impacts** There is a potential for long-term indirect adverse impacts to OPS from the unburned fuels, emissions, and noise associated with FFE deterrents training. There will be lower concentrations of hydrocarbons distributed over the site due to the reduced fuel usage.

### 5.2.2.11.B.3 Issue: *Use of Chemical Simulants, Radiological Isotopes and Biological Simulants.*

There is a concern that chemical simulants, radiological isotopes, and biological materials that simulate biological agents could cause adverse impacts to OPS. The TG related to this issue are: TG 1.4 NBC Warning and Reporting; TG 2.1 BIDS Employment & Operation; TG 3.1 FOX Battlefield Employment & Operations; TG 6.1 NBC Procedures; TG 6.4 NBC Survival and Recovery; and TG 8.1 Radiation Safety. OPS could be exposed to chemical simulants, radiological isotopes, or biological materials that simulate biological agents through ingestion, inhalation (gas transfer), and/or exterior exposure or deposition. Exposure to these materials could inhibit reproduction, increase stress, restrict feeding/foraging efficiency, and cause mortality in extreme cases. Increased stress levels could make the OPS more susceptible to disease or parasites.

The radiological isotopes used during training as described in Appendix B are used under carefully controlled conditions, and since the materials are removed from the environment after training, the likelihood of OPS being exposed to radiological materials is extremely remote.

Impacts to OPS from biological materials that simulate biological agents are not likely. The materials are naturally occurring bacteria, clay, and proteins. The materials, as described in Volume III, Appendix B, are used in relatively small quantities and are not known to be toxic or pathogenic.

Impacts to OPS from chemical simulants are not likely. The simulants are used in small quantities, controlled conditions, and have low toxicity levels. The chemical simulants do not biomagnify and are attenuated by the environment quickly because they are readily degraded by microbes, are volatile, photodecompose, are quickly metabolized and/or readily excreted. The majority of the simulants, even in large quantities or high doses, are not considered carcinogens. Some of the simulants occur naturally in plant tissue and soil. If used indiscriminately and in large quantities the CS (tear) gas, naphthalene (moth balls), nicotine, methylene chloride, and tetrachloroethane could cause adverse impacts. These simulants have higher toxicity, are possible carcinogens, or are less likely to be quickly attenuated by the environment.

#### 5.2.2.11.B.3.1 RCP Alternative

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to OPS from the use of chemical simulants, radiological isotopes, and biological materials that simulate biological agents under the RCP Alternative. Possible impacts are discussed in subsection 5.2.2.11.B.3. If impacts to OPS do occur, they are expected to be very minor and localized.

  Under the RCP Alternative, sealed radiological isotopes will be used and the ability to use unsealed radiological isotopes retained during exterior training. The possible impacts to OPS are considered negligible because of the controlled conditions and the type of materials used.

#### 5.2.2.11.B.3.2 OPTM (Army's Proposed Action) and EPTM Alternatives

- **Indirect Impacts** There is a potential for negligible long-term indirect adverse impacts to OPS from the use of chemical simulants, radiological isotopes, and biological materials that simulate biological agents under the OPTM (Army's Proposed Action) and EPTM Alternatives. Possible impacts are discussed in 5.2.2.11.B.3. If impacts to OPS do occur, they are expected to be very minor and localized.

  Under the OPTM (Army's Proposed Action) and EPTM Alternatives only sealed radiological isotopes will be used during exterior training. Possible impacts to OPS are considered negligible because of the controlled conditions and the use of sealed materials.

### 5.2.2.11.B.4 Issue: *Use of Fog Oil Obscurant.*

There is a concern that fog oil may harm OPS during fog oil obscurant training. The TG related to this issue are: TG 7.2 Basic Obscurant

Employment Operations (Static); TG 7.3 Mobile Obscurant Employment Operations; and TG 7.4 Field Training Obscurant Employment Operations.

A description of the fog oil composition, deposition, degradation and toxicity is found at subsections 5.2.2.3, 5.2.2.5.A.1, 5.2.2.6.4 and 5.2.2.15.B. Concentrations of fog oil to which man or the environment are typically exposed during obscurant training are far less than those concentrations found toxic in field and laboratory studies (Liljegren, 1988; Palmer, 1990; and Driver, 1993). None of the organic compounds contained in fog oil biomagnify in the environment (Neff, 1979). The chemical composition of different fog oils will vary due primarily to the source of oil. This is discussed in subsection 5.5.15.B. To account for this variability, Army manufacturing specifications detailed in the fog oil human health literature review, contained in Appendix E of the Preliminary Human Health Risk Evaluation (COE KC, 1997c), require manufacturers to conduct and pass certain toxicity tests on the fog oil they manufacture for the Army. One of the tests is an analysis for PAH content in the fog oil, while the other two are tests for carcinogenicity and mutagenicity. This required testing program assures greater standardization of fog oil (between and within manufacturers) as measured by toxicity and PAH content. A common element for all fog oils manufactured for the Army is that they are "severely treated" to significantly reduce or remove toxic PAHs. While some compositional variations are anticipated for the fog oils manufactured, there is considerable research evidence that mineral oils, which have been subjected to severe treatment during manufacturing, typically exhibit low toxicity.

The potential of fog oil to deposit on birds in such quantity as to affect thermal regulation is considered remote. A description of fog oil deposition is detailed at 5.2.2.5.A.1, 5.2.2.6.4 and 5.2.2.15.B. The amount of fog oil deposited on artificial collection surfaces placed as close as 25 meters from a generator, was so small that it could not be measured at a detection limit of 0.00008 $g/m^2$ (Liljegren, 1988). The highest amount of fog oil that was predicted by deposition modelling of 20 generators operating for 2 hours, was 0.01 $g/m^2$ (COE KC, 1997b). Even though the deposition model has never been verified by experimental evidence, the model results will be used in this analysis as it represents the worst possible case. Assuming a bird the size of a robin is exposed for two hours (most training events are actually 30 minutes), the maximum possible deposition amount that could land on the bird would be approximately 1/250 (one two hundred and fiftieth) of one drop. In this hypothetical amount of deposition spread evenly over the surface of a robin (and other birds) or even deposited in mass on one pinhead sized area of the bird, is not enough to wet a feather or feathers to the extent that they would lose their ability to thermo-regulate. When collecting samples of fog oil in the air at stations as close as 10 meters downwind of a generator, oil-films could not be visually detected or detected by touch on clothing surfaces or on the lenses of safety glasses (COE KC, 1997c). Individuals involved in sampling fog oil stood in position to take samples for 25 to 35 minutes. This real life experience, in combination with the extremely small amount of fog oil deposition predicted through modeling, support a conclusion that worst-case fog oil deposition will not disrupt the insulating quality of a feather and therefore, the ability of a bird to thermo-regulate will not be affected.

There are several important fog oil fate and effects features which indicate adverse effects will not be anticipated for bird embryos in eggs, neonatal birds, and the integuments of amphibians, reptiles and mammals (FLW, 1997). They include the following: 1) the amount of fog oil deposition on surfaces is so low that it could not be chemically detected at 0.00008 $g/m^2$ (Liljegren, 1988), 2) the ability of fog oil to irritate skin of humans upon direct application of liquid oil is minimal (IOU, 1989), and 3) that fog oil has very low toxicity when ingested (IOU, 1989 and FLW, 1997). Potential exposures to neonatal birds would come from deposition to skin surfaces, inhalation of fog oil in the air and ingesting of food containing fog oil or from preening activities. As related above, fog oil deposition is so small that adverse alteration of the protective nature of neonatal down feathers are not anticipated. The small predicted depositional quantities of fog oil per unit surface area indicate neonatal birds have little chance of consuming harmful quantities of fog oil when eating food containing fog oil and ingest fog oil when preening (FLW, 1997).

Adverse impacts to bird embryos in eggs are not anticipated due to the low concentration of aromatics in fog oil (COE KC, 1997b), its low toxicity (FLW, 1997) and the extremely small amount predicted (by models) to deposit on surfaces (FLW, 1997). Driver (1993) shows that as little as 1µg of fuel oil applied to 2 percent of the shell was enough to cause significant mortality. Lesser depositional amounts (per unit

surface area) would results from fog oil training than the amounts found to cause embryo toxicity. Also, fog oil is much less toxic than fuel oil due to the reduced aromatic fraction from severe processing as compared to fuel oils (COE KC, 1997d).

Dermal toxicity tests with laboratory animals indicate high concentrations must be applied to skin for prolonged periods of time and repeated applications to elicit even mild dermal effects with fog oil (FLW, 1997). Fog oils are not considered to be skin sensitizes or eye irritants (Driver, 1993). Potential dermal exposure concentrations of fog oil as predicted by deposition models for obscurant training will be much lower than exposure concentrations which have been shown to cause an effects (Driver, 1993 and FLW, 1997). Therefore, adverse effects are not anticipated from dermal exposure to amphibians, reptiles and mammals.

Depositional amounts of fog oil are so slight that oil sheens on water are not anticipated. Oxygen transfer impairment from air above the water to the aquatic species residing in the water column would only occur with oil thicknesses on water that exceed the oils ability to form a sheen (Anderson, 1974). Surface-dwelling invertebrates should not be affected by fog oil obscurant smoke since there is little potential for deposition rates to be large enough to produce a sheen upon the water.

Flora used by OPS for habitat, protection and food, have little potential for adverse impact from fog oil exposure and are expected to retain its same value to wildlife. Moderate phytotoxic effects were observed when plants were exposed in experimental settings to high concentrations of liquid fog oil and fog oil smoke. The moderate phytotoxic effects occurred from doses of 100 to 500 µg fog oil per $cm^2$ (equal to 1g/$m^2$ to 5 g/$m^2$) applied to leaf surfaces. These doses were considered the equivalent to 2 to 8 hours of exposure to 900 mg/$m^3$ (Driver, 1993, and Cataldo, 1989). The experimental exposures are from 100 to 500 times higher than the highest deposition amounts (per unit surface area) predicted by modeling conducted for the ecological risk assessment (COE KC, 1997b). The modeling predicted fog oil deposition that is projected to be much higher than actual since the model assumed over 3 times the actual rate of fog oil usage for a single training event and assumed training would last for over 8 times longer than actual. Although biomass production was decreased in some species, seed germination was not affected (Driver, 1993). Given the exaggerated doses required to elicit a "moderate phytotoxic effect" as compared to reasonably anticipated exposures, significant impacts to plants would not be expected.

Based on an ecological risk assessment for amphibians, reptiles, and birds (COE KC, 1997b), no toxicity effects were determined for nonadult life stages from inhalation, dermal, and ingestion exposures from fog oil smoke training at FLW. Effects from inhalation for adult yellowbelly racers and adult Northern bobwhite are not anticipated. No acute toxicological effects, regardless of the exposure pathway or atmospheric stability, could be predicted for the species studied. However, the risk analysis determined a potential for chronic respiratory inhalation effects from fog oil smoke for adult American robins under the RCP and OPTM alternatives and for green frogs under the RCP, OPTM, and EPTM alternatives. Other amphibians and birds with comparable life history characteristics have the potential to be affected similarly. Toxicological effects associated with the inhalation of unsafe doses of fog oil were oil pneumonia, immunodepression, and/or minor lesions of the heart, liver, and lungs. Similar fog oil inhalation risk findings were determined for Federal T & E species using the same risk assessment methods, dispersion models, and exposure assumptions that were used for the risk assessment for amphibians, reptiles and birds (used as surrogates to represent OPS).

Although the risk assessments predicted the potential for chronic inhalation effects to both T & E and amphibians/birds (i.e., non-T & E species), the effects predicted for non-T & E species were not accorded the same level of significance as were those for T & E species. The reasons are as follows:

- The results of ecological risk assessments are highly uncertain. By design, ecological risk assessments error on the conservative side of protection and therefore a positive prediction of risk does not necessarily mean an adverse risk will occur.

- The worst-case exposure assumptions used for both the T & E and non-T & E risk assessments are considered unlikely. The predicted exposures used for these risk assessments assumed a

greater quantity of fog oil usage than actually planned at FLW and more frequent exposures for longer periods of time over larger areas than are reasonably expected based on historic observations and experience during training at FMC.

- T & E species deserve very conservative protection measures because of the fragile nature of their populations. That is why the highly conservative (protective) results of a risk assessment are given greater significance for T & E species than non-T & E.

As discussed above, the risk analysis determined a potential for chronic respiratory inhalation effects from fog oil smoke for adult American robins under the RCP and OPTM alternatives and green frogs under the RCP, OPTM, and EPTM alternatives. Other amphibians and birds with comparable life history characteristics have the potential to be affected similarly (COE KC, 1997b). Using the worst-case exposures as predicted by modeling in the risk analysis, the maximum area and maximum distance for toxic concentrations that could elicit chronic inhalation effects would be:

- 20 percent of the installation with a maximum distance of 4000 meters for adult American robins and comparable species under the RCP and OPTM (Army's Proposed Action) alternatives from mobile smoke training; and
- 20 percent of the installation with a maximum distance of 4000 meters for adult green frogs and comparable species under the RCP, OPTM (Army's Proposed Action) and EPTM alternative from mobile smoke training.

For purposes of the OPS analysis, it was assumed that OPS populations were evenly distributed throughout the installation because of the large number of species and varying populations represented by the OPS resource category. Under the assumption of even population distribution, approximately 20 percent of adult American robins, adult green frogs, and their comparable species have the potential to experience chronic inhalation effects by using the worst-case exposure scenario during mobile smoke training.

The physical presence of additional people on the smoke ranges will increase the amount of disturbance to OPS and their habitat.

Under the Army's Proposed LU & FP (CH&I) obscurant operations will occur at Range 30 for static smoke training and Cannon Range, Ballard Hollow, Musgrave Hollow, and Bailey/McCann Hollow for mobile and field smoke training.

**5.2.2.11.B.4.1 RCP Alternative.** The amount of fog oil used during obscurant training under the RCP Alternative (for TG 7.2, 7.3 and 7.4) would be up to 125,500 gallons (476,900 liters) per year as discussed in subsection 5.2.2.5.A.1.1.

- **Direct Impacts.** There may be minor long-term direct adverse impacts to OPS as a result of fog oil obscurant training under the RCP Alternative. The primary direct impacts will be from the disturbance associated with the opaque fog oil plume that may disrupt or interfere with feeding, resting, and other activities of OPS, especially sight feeding species.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to OPS as a result of fog oil obscurant training under the RCP Alternative. Minor impacts are anticipated to vegetation that may provide habitat for OPS.

**5.2.2.11.B.4.2 OPTM (Army's Proposed Action) Alternative.** The amount of fog oil used during obscurant training under the OPTM (Army's Proposed Action) Alternative (for TG 7.2, 7.3 and 7.4) would be up to 84,500 gallons (321,100 liters) per year as discussed in subsection 5.2.2.5.A.1.2. There is a 41,000 gallon (155,800 liter) difference between the OPTM (Army's Proposed Action) Alternative and the RCP Alternative or a 32.7 percent decrease in the amount of fog oil used.

- **Direct Impacts.** There may be minor long-term direct adverse impacts to OPS as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. The primary direct impacts will be from the disturbance associated with the opaque fog oil plume as discussed in subsection 5.2.2.11.B.4. There will be a lower potential for direct impacts under the OPTM (Army's Proposed Action) Alternative than the RCP Alternative.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to OPS as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. Minor impacts are anticipated for vegetation that may provide habitat for OPS. There will be a lower potential for indirect impacts under the OPTM (Army's Proposed Action) Alternative than the RCP Alternative.

**5.2.2.11.B.4.3 EPTM Alternative.** The amount of fog oil released during obscurant training under the EPTM Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 49,500 gallons (176,700 liters) per year as discussed in subsection 5.2.2.5.A.1.3. There is a 76,000 gallon (288,800 liter) difference in the amount of fog oil used between the EPTM Alternative and the RCP Alternative or a 60.6% decrease in the amount of fog oil used, and there is a 35,000 gallon (133,000 liter) difference between the OPTM (Army's Proposed Action) Alternative and the EPTM Alternative or a 41.4% decrease in the amount of fog oil used.

- **Direct Impacts.** There may be minor long-term direct adverse impacts to OPS as a result of fog oil obscurant training under the EPTM Alternative. The primary direct impacts will be from the disturbance associated with the opaque fog oil plume as discussed in 5.2.2.11.B.4. There will be an even lower potential for direct impacts under the EPTM Alternative than the OPTM (Army's Proposed Action) Alternative or RCP Alternative.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to OPS as a result of fog oil obscurant training under the EPTM Alternative. Minor impacts are anticipated for vegetation that may provide habitat for OPS. There will be an even lower potential for indirect impacts under the EPTM Alternative than the OPTM (Army's Proposed Action) Alternative or RCP Alternative.

## 5.2.2.11.C Wetlands

Wetlands are complex habitats that are transitional from dry land to open water, and they have soil, water and plant components. Wetlands are typically defined as those areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil condition. Typical wetland types include swamps, marshes, bogs and similar areas (Figure 4.9). This discussion will deal primarily with impacts to wetland vegetation.

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to wetlands:

- Vehicle operations on training and maneuver areas; and
- Use of fog oil obscurant.

**5.2.2.11.C.1 Issue: *Vehicle Operations on Training and Maneuver Areas.*** Field maneuver training, vehicle operations, and operation of live fire ranges may contaminate soils, destroy vegetation, and degrade wetland habitat. The TGs related to this issue are: TG 1.2 Maneuver Operations; TG 1.8 Warfighting and Tactical Operation; TG 2.1 BIDS Employment and Operation; TG 3.1 FOX Battlefield Employment and Operation; TG 6.2 NBC Equipment (Hasty Decontamination Training); TG 7.3 Mobile Obscurant Employment Operations; TG 7.4 Field Training Obscurant Employment Operations; and TG 10.1 Weapons Training.

Field maneuver training, vehicle operations, and operation of live fire ranges could physically degrade vegetation, increase sediment loading, and increase runoff of fuels, motor oils, transmission fluids,

hydraulic fluids, grease, and brake fluids to wetlands. A discussion of impacts to aquatic species, which are often associated with wetlands, can be found in subsection 5.2.2.11.D.4.

Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW.

- **Direct Impacts.** There is a potential for minor long-term direct adverse impacts to wetlands related to vehicle and maneuver operations under the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives. The direct impacts will be from damage to wetland plants during vehicle operations within wetlands. There will be a potential for direct adverse impacts to wetlands from TG 7.3 Mobile Obscurant Employment Operations and TG 7.4 Field Training Obscurant Employment Operations under the Army's Proposed LU & FP (CH&I). According to the 1995 FLW Wetlands Inventory (FLW, 1995e), a portion of the Ballard Hollow Mobile Smoke Range is a wetland complex consisting of shallow marsh and bottomland hardwood wetlands. Before training is implemented, a wetlands jurisdictional determination will be made and additional environmental documentation prepared.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to wetlands related to vehicle and maneuver operations under the RCP Alternative, OPTM (Army's Proposed Action) Alternative, and EPTM Alternative. The primary indirect impacts will be from contaminants related to vehicle operations and sediment loading from increased erosion. A discussion on soil erosion can be found in 5.2.2.6.

**5.2.2.11.C.2 Issue: *Use of Fog Oil Obscurant.*** There is a concern that fog oil may degrade wetlands during fog oil obscurant training. The TGs related to this issue are: TG 7.2 Basic Obscurant Employment Operations (Static); TG 7.3 Mobile Obscurant Employment Operations; and TG 7.4 Field Training Obscurant Employment Operations.

Moderate phytotoxic effects were observed when plants were exposed in experimental settings to high concentrations of liquid fog oil and fog oil smoke. The moderate phytotoxic effects occurred from doses of 100 to 500 µg fog oil/$cm^2$ (equal to 1g/$m^2$ to 5 g/$m^2$) applied to leaf surfaces. These doses were considered the equivalent to 2 to 8 hours of exposure to 900 mg/$m^3$ (Driver, 1993, and Cataldo,. 1989) and are from 100 to 500 times higher than the highest deposition amounts per unit surface area predicted by modeling (COE KC, 1997b). The modeling predicted fog oil deposition much higher than actual since the model assumed over 3 times the actual rate of fog oil usage for a single training event and assumed training would last for over 8 times longer than actual. Although biomass production was decreased in some species, seed germination was not affected (Driver, 1993). Given the exaggerated doses required to elicit a "moderate phytotoxic effect" as compared to reasonably anticipated exposures, significant impacts to plants would not be expected.

Fog oil obscurant could be deposited directly onto wetlands via wind currents and indirectly by runoff from adjacent uplands. Since the deposition rate of fog oil as predicted by modeling is very minute (COE KC, 1995), the potential impacts to wetlands and wetland vegetation are expected to be very minor. See subsection 5.2.2.11.D.1 for a discussion of fog oil deposition in aquatic systems.

Under the Army's Proposed LU & FP (CH&I) obscurant operations will occur at Range 30 for static smoke training and Cannon Range (Mush Paddle Hollow), Ballard Hollow, Musgrave Hollow and Bailey/McCann Hollow for mobile and field smoke training.

**5.2.2.11.C.2.1 RCP Alternative.** The amount of fog oil released during obscurant training under the RCP Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 125,500 gallons (476,900 liters) per year as discussed in subsection 5.2.2.5.A.1.1.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to wetlands as a result of fog oil obscurant training under the RCP alternative. Minor impacts are anticipated

for wetland vegetation as described in subsection 5.2.2.11.C.2 and aquatic species as described in subsection 5.2.2.11.D.1.

**5.2.2.11.C.2.2 OPTM (Army's Proposed Action) Alternative.** The amount of fog oil released during obscurant training under the OPTM (Army's Proposed Action) Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 84,500 gallons (321,100 liters) per year as discussed in subsection 5.2.2.5.A.1.2.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to wetlands as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. Minor impacts are anticipated for wetland vegetation as described in 5.2.2.11.C.2 and aquatic species as described in 5.2.2.11.D.1. Because of the reduced amount of fog oil utilized, there will be a lower potential for indirect adverse impacts to wetlands under the OPTM (Army's Proposed Action) Alternative than under the RCP Alternative.

**5.2.2.11.C.2.3 EPTM Alternative.** The amount of fog oil released during obscurant training under the EPTM Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 49,500 gallons (188,100 liters) per year as discussed in subsection 5.2.2.5.A.1.3.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to wetlands as a result of fog oil obscurant training under the EPTM Alternative. Minor impacts are anticipated for wetland vegetation as described in subsection 5.2.2.11.C.2 and aquatic species as described in subsection 5.2.2.11.D.1.

  Because of the reduced amount of fog oil utilized, there will be a lower potential for indirect adverse impacts to wetlands under the EPTM Alternative than under the OPTM (Army's Proposed Action) Alternative or RCP Alternative.

## 5.2.2.11.D Aquatic Resources

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Aquatic Resources:

- Deposition of fog oil obscurant;
- Accidental spills of fog oil;
- In-stream or in-lake vehicle operations;
- Runoff from training and maneuver areas;
- Release of unburned fuels from FFE deterrents;
- Maintenance training and operations.

**5.2.2.11.D.1 Issue: *Deposition of Fog Oil Obscurant.*** There is a concern that fog oil may enter installation waters during fog oil obscurant training and cause adverse affects to aquatic species. The primary effects in question relate to: increased mortality in aquatic species; bioconcentration and/or bioaccumulation in aquatic organisms; biomagnification in higher trophic levels; water quality degradation; and effects to protected species. The TGs related to this issue are: 7.2 Basic Obscurant Employment Operations (Static); 7.3 Mobile Obscurant Employment Operations; and 7.4 Field Training Obscurant Employment Operations.

Fog oil (SGF 2) is the predominant material used by the military to produce smoke during the obscurant training. The smoke generators to be used in training at FLW have a fog oil consumption rate of 40 to 80 gallons (152 to 304 liters) per hour. Using these generators, liquid fog oil is heated and emitted into the atmosphere. As the fog oil is released from the generators into the cooler air temperature, it condenses into tiny droplets of oil that range from 0.6 to 3.0 $\mu$m in diameter, and these droplets form an opaque, fog-like mist. The fog oil is aerosolized and not burned as the name "smoke" implies. The small size and specific gravity of the fog oil droplets allows for them to be easily carried by the wind (Driver, 1993).

Previous studies show that fog oil droplets may remain in the air for an average of one hour, but this is greatly affected by meteorological conditions (Liss-Suter, 1978).

Discussions at 5.2.2.3, 5.2.2.5.A.1, 5.2.2.6.4, 5.2.2.11.B.4 and 5.2.2.15.B.1 provide detailed discussion on fog oil deposition, fate and effects. Experience at FMC (Anniston, Alabama) where fog oil obscurant training is conducted and at Aberdeen Proving Grounds, Edgewood, Maryland which serves as the Army's experimental/development arm for fog oil smoke is that fog oil obscurant smoke deposition is so slight that sheens are not formed on water. The minimum amount of oil required to produce a sheen on water is extremely small and well below those amounts that are toxic to aquatic species (Anderson, 1974). Furthermore, aquatic species which occupy the air-water interface are not anticipated to have adverse effects because not enough oil is deposited to cause a sheen. Finally mineral oils, like fog oil, have very limited toxicity due mainly to the low concentration of low-molecular weight aromatic hydrocarbons in the oil. Large layers of oil on water are necessary before oxygen transfer from the air into the water column is impeded. The small quantities of oil that are theoretically possible to impact surface waters are well below those quantities that would have the potential to negatively affect oxygen transfer tissues of aquatic species.

In summary, no significant adverse impacts to aquatic species are anticipated based upon the following:

1) The toxicity of fog oil is very limited;
2) Deposition rates of fog oil are very low and will not cause a sheen on the water;
3) The amount of fog oil that could potentially be deposited on water is well below concentrations that are toxic to aquatic species;
4) Fog oil is rapidly degraded through natural microbial processes, does not accumulate in soil, and does not accumulate in surface waters; and
5) Fog oil does not biomagnify, bioaccumulate, or bioconcentrate in plant or animal tissues.

Under the Army's Proposed LU & FP (CH&I), obscurant operations will occur at Range 30 for static smoke training and Cannon Range, Ballard Hollow, Musgrave Hollow, and Bailey/McCann Hollow for mobile and field smoke training.

Long-term adverse impacts are not anticipated to occur on aquatic resources under the RCP, OPTM (Army's Proposed Action) or EPTM Alternative. Based upon the discussion in 5.2.2.5.A.1, 5.2.2.6.4, 5.2.2.11.B.4 and 5.2.2.15.B.1, and above under this issue, the probability of adverse impacts to aquatic resources are considered very low. Since fog oil deposition rates are very minute, potential runoff of fog oil into surface waters will be below levels considered biologically significant.

**5.2.2.11.D.2 Issue: *Accidental Spills of Fog Oil.*** There is a potential for impacts to aquatic resources from fog oil spills at oil handling and storage areas and on smoke ranges during fog oil training. These inadvertent spills or leaks may enter installation waters through runoff associated with precipitation events or in the event of a major spill the fog oil may flow into installation waters directly. The amount of a major spill will be limited to a 55-gallon (209 liters) drum or the capacity of the largest generator fuel tank. Fort Leonard Wood has an established Installation Spill Contingency Plan (Radian, 1994), which provides guidance for the safe and effective control, prevention, containment, cleanup, disposal, restoration and reporting of accidental spills or releases into the environment of oil, hazardous materials and hazardous wastes. Any accidental spills that occur would be handled in accordance with the requirements of these plans. The plans adequately address the procedures for cleanup should a spill occur. Therefore no significant direct adverse impact from a spill is anticipated. The TGs related to this issue are: TG 7.2 Basic Obscurant Employment Operations (static); TG 7.3 Mobile Obscurant Employment Operations; TG 7.4 Field Training Obscurant Employment Operations; and TG 7.6 Obscurant Storage Operations.

Fog oil is relatively non-toxic and is degraded rapidly through microbial processes. Evidence of the biodegradation processes occurring in the natural environment was demonstrated by Raymond (1976). Number 2 fuel oil (diesel) at 2,500 mg/kg concentrations was used to contaminate different soil types, and after one year the hydrocarbons in the soil were reduced between 48-90 percent. Similarly, a single application of 2.98 liters per square meter of mineral-based crankcase oil from automobiles and trucks

was applied to field soil plots in Pennsylvania (silt loam), Oklahoma (sandy loam), and Texas (clay loam). The hydrocarbons were degraded by 55-82 percent for automobiles crankcase oil and 24-53 percent for truck crankcase oil over a one year period. Fertilized field plots degraded the hydrocarbons an additional 20 percent (Raymond, 1976).

Under the Army's Proposed LU & FP (CH&I) obscurant operations will occur at Cannon Range, Ballard Hollow, Musgrave Hollow, and Bailey/McCann Hollow for mobile and field smoke training.

#### 5.2.2.11.D.2.1 RCP Alternative

- **Indirect Impacts.** There is a potential for minor short-term adverse impacts to aquatic resources from minor small quantity fog oil spills during field training activities and from runoff from uncovered storage facilities. However, with the response plan and instructions for cleaning up any accidental spills already part of the FLW standard operating procedures, the potential for adverse impacts from spills is very low.

  As long as fog oil is stored, handled, transported, or used in training on FLW, there will be a potential for spills. Unforeseen accidents, carelessness or natural disasters could lead to discharges of fog oil. These impacts will be short-term adverse to aquatic resources if spilled material makes it into surface waters. The possibility of large quantities of fog oil being spilled into surface waters will be very remote.

  Given the fact that fog oil degrades rapidly and is relatively non-toxic, minor inadvertent spills on training ranges should not cause long-term adverse impacts to aquatic resources. It is unlikely that these minor spills will reach surface waters. There is a greater potential for fog oil spills under the RCP Alternative, because larger quantities of fog oil (41,000 gallons (155,800 liters) are used that are greater than the OPTM (Army's Proposed Action) Alternative and 76,000 gallons (288,800 liters) greater than the EPTM Alternative) will be used and handled which increases the chances of accidental spills.

  Fog oil will be stored in 55-gallon drums with a maximum of 27,500 gallons (104,500 liters) stored in two uncovered storage areas located along FLW 38 immediately northwest of Range 30 and near the Ballard Hollow Mobile Smoke Range. The primary storage facility will be along FLW 38, and it is located over two miles from permanent surface waters. Since the storage areas will be uncovered, there is a potential for minor but consistent releases of fog oil during precipitation events. The minor amounts of fog oil that could be transported in runoff may adversely impact some aquatic species, however, these minor impacts should be localized, short-term, and should not be significant.

#### 5.2.2.11.D.2.2 OPTM (Army's Proposed Action) Alternative

- **Indirect Impacts.** There is a potential for minor short-term adverse impacts to aquatic resources from minor small quantity fog oil spills during field training activities. However, with the response plan and instructions for cleaning up any accidental spills already part of the FLW standard operating procedures, the potential for adverse impacts from spills is very low.

  Given the fact that fog oil degrades rapidly and is relatively non toxic, minor inadvertent spills on training ranges should not cause long-term adverse impacts to aquatic resources. It is unlikely that these minor spills will reach surface waters. There will be a reduction of 41,000 gallons (155,800 liters) between the RCP Alternative and the OPTM (Army's Proposed Action) Alternative. This approximately 33 percent decrease in the amount of fog oil used at FLW reduces the potential for accidental spills.

  Fog oil will be stored in two covered storage areas located along FLW 38 immediately northwest of Range 30 and near the Ballard Hollow Mobile Smoke Range. The fact that these storage areas

are covered eliminates the problems of uncovered storage as discussed in subsection 5.2.2.11.D.2.1.

#### 5.2.2.11.D.2.3 EPTM Alternative

- **Indirect Impacts.** There is a potential for minor short-term adverse impacts to aquatic resources from minor small quantity fog oil spills during field obscurant training activities. However, with the response plan and instructions for cleaning up any accidental spills already part of the FLW standard operating procedures, the potential for adverse impacts from spills is very low.

  Given the fact that fog oil degrades rapidly and is relatively non toxic, minor inadvertent spills on training ranges should not cause long-term adverse impacts to aquatic resources. It is unlikely that these minor spills will reach surface waters. There will be a reduction of 76,000 gallons (288,800 liter) between the RCP Alternative and the EPTM Alternative (60.6% reduction), and there is a 35,000 gallon (133,000 liter) reduction between the OPTM (Army's Proposed Action) Alternative and the EPTM Alternative (41.4% reduction). These decreases in the amount of fog oil used at FLW reduce the potential for accidental spills.

  Fog oil will be stored in one covered storage area located along FLW 38 immediately northwest of Range 30. The fact that this storage area is covered eliminates the problems of uncovered storage as discussed in subsection 5.2.2.11.D.2.1.

### 5.2.2.11.D.3 Issue: *In-Stream Crossing or In-Lake Vehicle Operations.*

The operation of vehicles in or through installation waters (including ponds, rivers, creeks, and intermittent streams) has the potential to impact aquatic organisms. These effects can range from direct mortality from vehicle wheels or tracks to water quality degradation from vehicle lubricants, petroleum products, and other vehicle related contaminants. The TG related to this issue are: TG 1.2 Maneuver Operations; TG 2.1 BIDS Employment and Operation; TG 3.1 FOX Battlefield Employment and Operation; TG 7.3 Mobile Obscurant Employment Operations; and TG 7.4 Field Training Obscurant Employment Operations.

According to a benthic macroinvertebrate analysis conducted by Ecological Specialists, Inc. (1996a), FLW streams, especially the Big Piney River and Roubidoux Creek, have a diversity of organisms, excellent Family Biotic Index (FBI) ratings, a high ratio of Ephemerotera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies)/Chironmid (EPT) taxanomic groups, and evenly distributed numbers of individuals across the taxanomic groups present. These are all indicators of good water quality. The fact that there is ongoing training at FLW which currently involves some in-stream vehicle operation and the fact that there is good water quality and a healthy invertebrate population in the installation streams, indicates that in-stream vehicle operations are not significantly adverse to aquatic species.

Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW.

- **Direct Impacts.** In-stream vehicle operation may cause direct long-term adverse impacts to aquatic species. The direct impacts to individual aquatic organisms will be short-term adverse, however, the effects on the aquatic species population will be long-term, because the direct impacts will be recurring due to the routine training operation. Mortality among aquatic species could occur when vehicles are operated in aquatic habitats such as streams, wetlands, or lakes. The greatest potential for these direct impacts will occur at unimproved stream crossings during field training. Immobile aquatic species such as freshwater mussels and benthic macro invertebrates would be most likely to be affected.

  Under the Army's Proposed LU & FP (CH&I), the FOX vehicle swim training will occur in Training Area 250, which was specifically designed and constructed for amphibious training for the express purpose of minimizing impacts to FLW streams. Training Area 250 is not managed for the protection of aquatic species.

- **Indirect Impacts.** There may be indirect long-term adverse impacts to aquatic species during in-stream vehicle operations. During in-stream vehicle operations, vehicle contaminants such as grease, oil, brake fluid, fuels, radiator coolant, and soil/debris attached to the vehicles may wash off the vehicle and cause impacts to aquatic species. Water quality sensitive species would be the most adversely impacted. The operation of vehicles in installation surface waters will also disturb and redistribute sediment increasing turbidity which may affect water quality sensitive species.

**5.2.2.11.D.4 Issue: *Runoff from Training and Maneuver Areas.*** Vehicle operations on training and maneuver areas and the use of high explosive rounds on impact ranges may damage vegetation and soils which can lead to increased soil erosion. Soil erosion coupled with various vehicle related contaminants may reach surface waters during runoff from storm events. The TGs related to this issue are: TG 1.2 Maneuver Operations; TG 1.8 Warfighting and Tactical Operation; TG 2.1 BIDS Employment and Operation; TG 3.1 FOX Battlefield Employment and Operation; TG 6.2 NBC Equipment (Hasty Decontamination Training); TG 7.3 Mobile Obscurant Employment Operations; TG 7.4 Field Training Obscurant Employment Operations; and TG 10.1 Weapons Training.

There are current ongoing training activities at FLW that have the same types of impacts to the training areas and impact ranges. According to a benthic macroinvertebrate analysis conducted by Ecological Specialist, Inc. (1996a), FLW streams, especially the Big Piney River and Roubidoux Creek, have a high taxa richness, excellent FBI ratings, a high ratio of EPT taxa, and evenly distributed numbers of individuals across the taxa present. These are all indicators of good water quality, which indicates that the ongoing mission at FLW has not adversely impacted aquatic species, some of which are very sensitive to habitat degradation. Since the overall range activities are expected to be similar to FY 1990 levels, the majority of impacts should be consistent with past training activities. The additional field maneuver training and the increased use of existing impact ranges should not significantly affect surface water quality or aquatic species.

#### 5.2.2.11.D.4.1 RCP Alternative

- **Indirect Impacts** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations. Disturbance from wheeled and/or tracked vehicles during maneuver or field training operations may cause increased soil erosion. High explosive grenades will also disturb soils and increase the potential for soil erosion. A detailed discussion of soil erosion can be found in subsection 5.2.2.6. Contaminants from vehicles such as fuel, radiator fluid, oil, and other lubricants may be unintentionally released through leaks and spills. Surface water runoff from training ranges and maneuver areas can transport sediment and contaminants into aquatic systems which may harm aquatic species.

  Under the Alternative 1 LU & FP (CH), hasty decon training will occur at the following sites: Penn's Pond (north); Penn's Pond (south); pond south of Training Area 243; pond at Training Area 238; pond in McCann Hollow; and Roubidoux Creek (south). Under the RCP Alternative, hasty decon training will involve washing vehicles to simulate field vehicle decontamination procedures. Antifreeze will be applied to the vehicle, and, using water from a permanent source such as a pond or creek, the antifreeze is washed off of the vehicles. By washing the vehicles in this manner the antifreeze and other vehicle contaminants may enter installation surface waters, especially at the decon sites, and adversely affect aquatic species.

#### 5.2.2.11.D.4.2 OPTM (Army's Proposed Action) and EPTM Alternatives

- **Indirect Impacts.** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations. The impacts will be the same as discussed in subsection 5.2.2.11.D.4.1 except for the hasty decon training.

  Under the OPTM (Army's Proposed Action) Alternative and EPTM Alternative, hasty decon training will involve washing vehicles to simulate field vehicle decontamination procedures,

however, instead of antifreeze being applied to the vehicle, PEG 200, which is non-toxic, will be applied to simulate chemical contaminants. Since no antifreeze will be applied to the vehicle before washing, there will be less potential impact from the OPTM (Army's Proposed Action) and the EPTM alternatives. However, vehicle POLs may enter installation surface waters and adversely impact aquatic species. Possible adverse impact from increased disturbance will also remain.

### 5.2.2.11.D.5 Issue: *Release of Unburned Fuels from FFE Deterrents Training.*

There is a concern that unburned fuel from the FFE deterrents training will enter installation waters and harm aquatic species. The TG related to this issue is 1.3 Mines and Obstacles. As a residual of the FFE deterrents training, unburned fuel will be scattered over the soil surface, and during the wall of flame portion of the FFE deterrents training, unburned fuels may seep into the soil. The explosion of fuels will also displace soil and kill vegetation. The unburned fuel could damage or kill vegetation which may increase the likelihood of soil erosion. The unburned fuels and eroded sediment may be carried to installation waters during storm events which could adversely impact aquatic species, especially intolerant sedentary species. Under the Army's Proposed LU & FP (CH&I), all FFE deterrents training will occur on Range 27A which is in the watershed of Roubidoux Creek. Roubidoux Creek provides habitat for a diverse population of aquatic species including water quality sensitive species of freshwater mussels and benthic macroinvertebrates.

See subsection 5.2.2.11.D.2 for a description of hydrocarbon degradation in the environment. If microbial degradation processes are not at a sufficient rate, it is likely that concentrations of fuel in the soil will begin to increase.

#### 5.2.2.11.D.5.1 RCP Alternative

- **Indirect Impacts.** There is a potential for long-term indirect adverse impacts to aquatic species from the unburned fuels associated with FFE deterrents training. See subsection 5.2.2.11.D.5 for a detailed discussion of the potential impacts to aquatic species. As discussed in subsection 5.2.2.5.A.5.1 above, FFE deterrents training will use approximately 900 gallons (3,420 liters) of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 2,870 gallons (10,906 liters) of unburned fuel per year.

#### 5.2.2.11.D.5.2 OPTM (Army's Proposed Action) and EPTM Alternatives

- **Indirect Impacts** There is a potential for long-term indirect adverse impacts to aquatic species from the unburned fuels associated with FFE deterrents training. In the OPTM (Army's Proposed Action) Alternative and EPTM Alternative, there will only be 550 gallons (2,090 liters) of fuel used per training cycle which is a 40 percent reduction from the RCP alternative. In addition, as discussed in subsection 5.1.4.2, the design of the training area will include the construction of features designed to reduce the potential for the release of unburned fuel to contaminate surface or groundwater.

### 5.2.2.11.D.6 Issue: *Maintenance Training and Operations.*

There is a concern that contaminants associated with maintenance training and operations may enter installation waters and harm aquatic species. The TGs related to this issue are: TG 2.2 BIDS Maintenance; TG 3.2 FOX Maintenance; TG 7.5 Obscurant Generator Maintenance; and TG 11.3 Vehicle Maintenance.

See discussion on vehicle contaminants in subsections 5.2.2.11.D.3 and see 5.2.2.11.D.2 for a description of hydrocarbon degradation in the environment.

#### 5.2.2.11.D.6.1 RCP Alternative

- **Indirect Impacts** There is the potential for long-term indirect adverse impacts from maintenance training and operation under the RCP Alternative. With this alternative, maintenance of BIDS,

FOX, smoke generators, HMMWV, and other vehicles and/or trailers would be allowed in parking lots or other areas that do not have surface water runoff controls. Grease, oil, fuels, antifreeze, or other vehicle contaminants could be washed off of the maintenance areas during storm events and could adversely affect aquatic resources.

Under the RCP Alternative this type of maintenance training would not be restricted to designated training areas.

#### 5.2.2.11.D.6.2 OPTM (Army's Proposed Action) and EPTM Alternatives

There will be no direct or indirect impacts to aquatic resources from maintenance training under the OPTM (Army's Proposed Action) or EPTM Alternatives, because all maintenance training under these alternatives will be in a controlled environment. All maintenance training will be restricted to maintenance bays that are equipped with oil/water separators and other spill/leak prevention designs.

## 5.2.2.11.E Terrestrial Resources

Terrestrial resources include most common resident species of mammals, reptiles, amphibians, and nonmigratory birds. Typical species include white-tailed deer, raccoon, opossum, black rat snake, garter snake, three-toed box turtle, red-eared slider, American toad, bullfrog, turkey, and northern bobwhite. The terrestrial resource category also includes vegetative habitats such as upland and bottomland forests, grasslands, old field communities and unique habitats such as sandstone glades, dolomite glades, or other unique natural features.

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to terrestrial resources:

- Vehicle operations on training and maneuver areas;
- Release of unburned fuels from FFE deterrents; and
- Use of fog oil obscurant.

**5.2.2.11.E.1 Issue: *Vehicle Operations on Training and Maneuver Areas.*** Field maneuver training, vehicle operations, and operation of live fire ranges may increase noise levels, increase the amount of human disturbance, impact air quality, contaminate soils, destroy vegetation, and degrade terrestrial resources. The TGs related to this issue are: TG 1.2 Maneuver Operations; TG 1.8 Warfighting and Tactical Operation; TG 2.1 BIDS Employment and Operation; TG 3.1 FOX Battlefield Employment and Operation; TG 6.2 NBC Equipment (Hasty Decontamination Training); TG 7.3 Mobile Obscurant Employment Operations; TG 7.4 Field Training Obscurant Employment Operations; and TG 10.1 Weapons Training.

Increased noise levels and the increased presence of people and equipment on training areas and ranges could disturb resident wildlife and cause areas to be temporarily abandoned which may increase stress levels. These disturbance to resident wildlife species could also inhibit mating, breeding, nesting, and feeding/foraging behavior. Uncontrolled off-road operation of vehicles could be harmful to ground-nesting birds and less mobile species of wildlife. Vehicle emissions and dust could cause respiratory problems for some terrestrial species.

Soils could be impacted from spills and leaking of fuel, motor oil, brake fluid, steering fluid, transmission fluid, hydraulic fluid, and grease which could degrade vegetation or impact water quality. Sensitive habitats could be destroyed or altered by off-road vehicle use. Vehicle operation on training areas could remove vegetation, cause soil erosion or compaction, and leave vehicle ruts. Eroded areas that have denuded vegetation are frequently re-vegetated with invasive or exotic plant species that are difficult to control. Live fire ranges could destroy vegetation and contaminate timber species with shrapnel.

#### 5.2.2.11.E.1.1 RCP Alternative

- **Direct Impacts.** There will be minor long-term direct adverse impacts to terrestrial resources from vehicles associated with training and maneuver operations under the RCP Alternative. The direct impacts will include destruction of vegetation, disturbance to wildlife, and possible mortality to wildlife species that have limited mobility. Since the overall range activities are expected to be similar to FY 1990 levels, the majority of the impacts should be consistent with past training activities, and no significant impacts are anticipated for the terrestrial species.

  Under the RCP Alternative, hasty decon training will involve washing vehicles to simulate field vehicle decontamination procedures. Antifreeze will be applied to the vehicle, and, using water from a permanent source such as a pond or creek, the antifreeze is washed off of the vehicles. By washing the vehicles in this manner, the antifreeze and other vehicle contaminants may degrade terrestrial habitat or enter installation surface waters, especially at the decon sites, and adversely affect wildlife water supplies. The increased disturbance around surface waters may adversely affect resident species that are often associated with surface waters such as frogs, salamanders, snakes, muskrats, and beavers. Under the Army's Proposed Land Use & Facility Plan, hasty decon training will occur at the following sites: Babb Airfield pond; Penn's Pond (north); Penn's Pond (south); pond south of Training Area 243; pond at Training Area 238; and pond in McCann Hollow.

- **Indirect Impacts.** There will be minor long-term indirect adverse impacts to terrestrial resources from vehicle operations associated with training and maneuver operations under the RCP Alternative. The primary indirect impacts to terrestrial resources will be in the form of habitat degradation associated with the destruction of plants, increased soil erosion/sediment loading, and potential contaminants from vehicle operations. Since the overall range activities are expected to be similar to FY 1990 levels, the majority of the impacts should be consistent with past training activities and no significant impacts are anticipated.

#### 5.2.2.11.E.1.2 OPTM (Army's Proposed Action) and EPTM Alternatives

- **Direct Impacts.** There will be minor long-term direct adverse impacts to terrestrial resources from vehicles associated with training and maneuver operations under the OPTM (Army's Proposed Action) Alternative and EPTM Alternative. These impacts will be the same as discussed in subsection 5.2.2.11.E.1.1 except for the hasty decon training.

  Under the OPTM (Army's Proposed Action) and EPTM Alternatives, hasty decon training will involve washing vehicles to simulate field vehicle decontamination procedures. However, instead of antifreeze being applied to the vehicle, PEG 200, which is non-toxic, will be applied. By washing the vehicles in this manner, vehicle contaminants may enter installation surface waters and adversely affect the water supply of resident species. Possible adverse impacts from increased disturbance will also remain. However, since no antifreeze will be applied to the vehicle before washing, there will be less potential impacts to terrestrial species from the OPTM Alternative and the EPTM Alternative. Hasty decon training will occur at the same locations as listed in subsection 5.2.2.11.E.1.1.

### 5.2.2.11.E.2 Issue: *Release of Unburned Fuels from FFE Deterrents Training.*

There is a concern that the unburned fuels remaining after FFE deterrents training will harm terrestrial resources by impacting air quality, degrading vegetation, destroying resident species habitat, and contaminating surface waters. The TG related to this issue is 1.3 Mines and Obstacles.

As a residual of the FFE deterrents training, unburned fuel will be scattered over the soil surface, and during the wall of flame portion of the FFE deterrents training, unburned fuels may seep into the soil. The explosion of fuels will also displace soil and kill vegetation. The unburned fuel could damage or kill vegetation which would increase the likelihood of soil erosion. The contaminated soils may not be

revegetated readily or invasive and/or exotic species of plants that are more tolerant to degraded soil conditions could become established.

Under the Army's Proposed LU & FP (CH&I) all FFE deterrents training will occur on Range 27A which is in the Roubidoux Creek watershed. Since all of the FFE deterrents training will be in a single area, the impacts to terrestrial resources should be localized.

#### 5.2.2.11.E.2.1 RCP Alternative

- **Direct Impacts.** There is a potential for long-term direct adverse impacts to terrestrial resources from the unburned fuels and noise associated with FFE deterrents training. The remaining fuel will kill vegetation in a localized area and the noise from the detonation will disturb resident wildlife species. As discussed in subsection 5.2.2.5.A.5.1 above, FFE deterrents training will use approximately 900 gallons (3,420 liters) of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 2,870 gallons (10,906 liters) of unburned fuel per year.

- **Indirect Impacts.** There is a potential for long-term indirect adverse impacts to terrestrial resources from the unburned fuels, emissions, and noise associated with FFE deterrents training.

#### 5.2.2.11.E.2.2 OPTM (Army's Proposed Action) and EPTM Alternatives

- **Direct Impacts.** There is a potential for long-term direct adverse impacts to terrestrial resources from the unburned fuels and noise associated with FFE deterrents training. The remaining fuel will kill vegetation in a localized area and the noise from the detonation will disturb resident wildlife species. The OPTM (Army's Proposed Action) and EPTM Alternatives would result in smaller impacts than those associated with the RCP Alternative. The degree of the impacts would be lessened as a result of the smaller amount of fuel used (550 gallons per training cycle vs 900 gallons for the RCP Alternative). As discussed in subsection 5.2.2.5.A.5.2 above, FFE deterrents training will use approximately 550 gallons (2,090 liters) of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 1,845 gallons (7,011 liters) of unburned fuel on the soil per year. In addition, modifications to the training area would be designed and constructed to collect unburned fuel and surface water runoff.

- **Indirect Impacts.** There is a potential for long-term indirect adverse impacts to terrestrial resources from the unburned fuels, emissions, and noise associated with FFE deterrents training.

### 5.2.2.11.E.3 Issue: *Use of Fog Oil Obscurant.*

See subsection 5.2.2.11.B.4 for a discussion of the effects of fog oil obscurant smoke fauna and flora at FLW.

Flora used by terrestrial wildlife for habitat, protection and food, have little potential for adverse impact from fog oil exposure and are expected to retain its same value to wildlife. Moderate phytotoxic effects were observed when plants were exposed in experimental settings to high concentrations of liquid fog oil and fog oil smoke. The moderate phytotoxic effects occurred from doses of 100 to 500 µg fog oil per $cm^2$ (equal to $1g/m^2$ to $5 g/m^2$) applied to leaf surfaces. These doses were considered the equivalent to 2 to 8 hours of exposure to 900 $mg/m^3$ (Driver, 1993, and Cataldo, 1989). The experimental exposures are from 100 to 500 times higher than the highest deposition amounts ( per unit surface area) predicted by modeling (COE KC, 1997b). The modeling predicted fog oil deposition that is projected to be much higher than actual since the model assumed over 3 times the actual rate of fog oil usage for a single training event and assumed training would last for over 8 times longer than actual. Although biomass production was decreased in some species, seed germination was not affected (Driver, 1993). Given the exaggerated doses required to elicit a "moderate phytotoxic effect" as compared to reasonably anticipated exposures, significant impacts to plants would not be expected.

The fog oil obscurant cloud has the potential to alter behavioral patterns to a variety of terrestrial species. Impacts to behaviors involved with such activities as foraging, nesting, flying, resting, mating, etc. may

have minor direct and indirect affects to populations. Potential chronic respiratory affects to terrestrial species were identified in an ecological risk assessment for amphibians, reptiles, and birds and these potential affects are discussed in subsection 5.2.2.11.B.4 (COE KC, 1997b).

**5.2.2.11.E.3.1 RCP Alternative.** The amount of fog oil released during obscurant training under the RCP Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 125,500 gallons (476,900 liters) per year as discussed in subsection 5.2.2.5.A.1.1.

- **Direct Impacts.** There may be minor long-term direct adverse impacts to terrestrial resources as a result of fog oil obscurant training under the RCP Alternative. The primary direct impacts will be from the disturbance associated with the opaque fog oil plume.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to terrestrial resources as a result of fog oil obscurant training under the RCP Alternative. Indirect impacts are anticipated for resident species because of the potential behavioral alterations to terrestrial wildlife from the opaque fog oil plume.

**5.2.2.11.E.3.2 OPTM (Army's Proposed Action) Alternative.** The amount of fog oil released during obscurant training under the OPTM (Army's Proposed Action) Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 84,500 gallons (321,100 liters) per year as discussed in subsection 5.2.2.5.A.1.2.

- **Direct Impacts.** There may be minor long-term direct adverse impacts to terrestrial resources as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. The primary direct impacts will be from the disturbance associated with the opaque fog oil plume.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to terrestrial resources as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. There will be a lower potential for indirect impacts under the OPTM (Army's Proposed Action) Alternative than the RCP Alternative.

**5.2.2.11.E.3.3 EPTM Alternative.** The amount of fog oil released during obscurant training under the EPTM Alternative (for TG 7.2, TG 7.3 and TG 7.4) would be up to 49,500 gallons (188,100 liters) per year as discussed in subsection 5.2.2.5.A.1.3.

- **Direct Impacts.** There may be minor long-term direct adverse impacts to terrestrial resources as a result of fog oil obscurant training under the EPTM Alternative. The primary direct impacts will be from the disturbance associated with the opaque fog oil plume and possible phytotoxic effects on some plants as discussed in subsection 5.2.2.11.B.4.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to terrestrial resources as a result of fog oil obscurant training under the EPTM Alternative. Minor impacts are anticipated for vegetation that may provide habitat for resident species. There will be a lower potential for indirect impacts under the EPTM alternative than the OPTM (Army's Proposed Action) Alternative or RCP Alternative.

## 5.2.2.12 Cultural Resources

As noted in subsection 4.12, FLW maintains compliance with all Federal and state regulations concerning cultural resources. Consultation on the effects of Federal undertakings on historic properties (including archaeological sites) under Section 106 consists of four basic steps:

- identification and evaluation of the historic properties;
- assessment of the undertaking's effects;
- consultation to avoid, reduce or minimize adverse effects; and
- council comment.

The Historic Preservation Plan (HPP) and this EIS clearly address the Section 106 process. Most importantly, the consultation between FLW and the Missouri State Historic Preservation Office has resulted in a "no effect" determination (Appendix G).

Implementation of the planned training objectives at FLW resulted in the following issues being identified:

- Alteration of surface or buried archaeological sites;
- Alteration of historic buildings or structures.

#### 5.2.2.12.1 Issue: *Alteration of Surface or Buried Archaeological Sites.*

Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW. Based on the cultural resource compliance activities outlined in subsection 4.11, especially the extensive surveys of thousands of acres at FLW; the guidance provided by the HPP; and recent surveys by the FLW archaeologist of all the areas where training would occur in support of the proposed BRAC training facilities, training activities will not impact any significant NRHP eligible cultural resources. Phase 1 archaeological surveys have been conducted at all of the locations where BRAC actions are to occur, for all the alternatives. As a result of these investigations, a determination of "no effect" has been established for proposed BRAC-related facilities at FLW by the Missouri State Historic Preservation Officer (SHPO) (Appendix G).

However, if archaeological materials are encountered during construction or training, all work will stop and the FLW archaeologist will be contacted immediately. Further guidance for this issue is provided in the treatment section of the HPP, specifically SOP No. 8, Emergency Archaeological Discovery (FLW, 1992a). In addition, all training activities will be conducted in accordance with FLW Regulation 210-14, Ranges and Training Areas (FLW, 1993a). This regulation specifies restrictions that apply to all training activities, including the establishment of all archaeological and historic sites as off-limits for training activities.

#### 5.2.2.12.2 Issue: *Alteration of Historic Buildings or Structures.*

Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW. The current implementation plans do not include the alteration, renovation or demolition of any historic buildings or structures.

### 5.2.2.13 Sociological Environment

Implementation of the planned training objectives at FLW will result in the following issues with respect to Sociological Environment:

- Attractiveness for residency;
- Visual and aesthetic effects of the new facilities;
- Visual and aesthetic effects of smoke training; and
- Environmental Justice.

#### 5.2.2.13.1 Issue: *Attractiveness of Area for Residency.*

The addition of facilities and training exercises specifically associated with the Military Police School and Chemical School may have a negative effect, real or perceived, on the attractiveness of the surrounding area for residential settlement. Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW. Under all of the alternatives, the facilities and training ranges associated with the new missions are located well within the FLW installation boundaries. Department of Army, Federal, and state regulations, policies and procedures will be followed to avoid, mitigate or minimize any on-post and off-post real or perceived environmental effects from Chemical School and Police School facilities and training exercises. The prevalence of adjacent public land (Mark Twain National Forest) buffers the installation's activities from the surrounding area.

- **Direct Impacts.** There will be no short-or-long term direct sociological impacts from the new training facilities and exercises on the continued attractiveness of the off-post area for residency under any of the alternatives.

- **Indirect Impacts.** There may be indirect short-term psychological impacts in the form of initial fear and hesitancy on the part of some people living within the immediate surrounding area. However, this perception will dissipate with time as the facilities and training activities become an accepted component of the environment.

**5.2.2.13.2 Issue: *Visual and Aesthetic Effects of the New Facilities.*** The new facilities associated with the training ranges and exercises may have visual and aesthetic impacts. Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW. None of the training related facilities will be visible from beyond the installation's boundaries. However, under each alternative all training facilities will be designed in accordance with the FLW Installation Design Guide (CP/ATA, 1986) which establishes specific design criteria and guidelines for building appearance and the visual image of the installation. Special attention will be taken to ensure that the new facilities will be aesthetically integrated into the existing built and natural environment at FLW.

- **Direct Impacts.** There will be no short-term nor long-term direct impacts of the new facilities on the visual and aesthetic environment under any of the alternatives since the facilities will not be visible from the nearby highways.

**5.2.2.13.3 Issue: *Visual and Aesthetic Effects of Smoke Training.*** Smoke training exercises associated with the new missions may result in negative visual and aesthetic impacts on the surrounding area.

**5.2.2.13.3.1 RCP Alternative.** The visual and aesthetic effects of fog oil smoke on the surrounding area will be controlled by several factors as explained in subsection 5.2.2.3.8 (Air Emissions from Fog Oil Training). The PSD permit from MDNR requires monitoring of smoke at the installation's boundaries, with no visual detection of smoke allowed beyond the installation's boundaries. In addition, smoke training exercises may be conducted only under certain prescribed meteorological conditions (i.e. specified atmospheric stability, wind direction, wind speed, and cloud cover).

Under the RCP and other alternatives, all of the static, mobile and field smoke training ranges are located in lower elevation areas within the central portion of the installation. Only two of the smoke training ranges are closer than a mile from the installation's boundaries. The area surrounding the installation to the east, west, and south is primarily federally-owned land and sparsely populated.

- **Direct Impacts.** The quantity of fog oil used annually for smoke training exercises is the greatest under the RCP Alternative. In addition, the frequency of smoke training exercises is also greatest under this alternative. Thus, the potential for any visual effects of smoke will be highest under this alternative.

  Smoke from the training exercises could be visible on the installation from certain vantage points off the installation. However, because of the above indicated controls, no clouds of smoke will pass outside the installation's boundaries. Thus, there will some short-term direct, adverse impacts related to visible smoke, but no long-term impacts are expected.

**5.2.2.13.3.2 OPTM (Army's Proposed Action) Alternative.** The visual and aesthetic effects of fog oil smoke on the surrounding area will be controlled by the same factors as under the RCP Alternative. In addition, the smoke training ranges are generally in the same area as under the RCP Alternative. All of the other factors indicated for the RCP Alternative also apply to this alternative.

- **Direct Impacts.** The potential visual effects of smoke training exercises will be less under this alternative since the amount of fog oil usage and frequency of training exercises is substantially

less than under the RCP Alternative. Thus, the impacts will be restricted to those short-term direct impacts as described above under the RCP Alternative.

**5.2.2.13.3.3 EPTM Alternative.** The visual and aesthetic effects of fog oil smoke on the surrounding area will be controlled by the same factors as under the RCP and OPTM (Army's Proposed Action) Alternatives. The location of the smoke training ranges and other related factors are similar to that under the above two alternatives.

- **Direct Impacts.** The potential visual effects of the smoke training exercises will be the least under this alternative because of the decrease in usage of fog oil and frequency of training exercises. The impacts will be restricted to those short-term direct impacts described under the RCP Alternative.

**5.2.2.13.4 Issue: *Environmental Justice.*** As discussed in Volume III, Appendix D, Executive Order 12898, issued in February 1994, directs Federal agencies to identify and analyze the potential socioeconomic impacts of proposed actions in accordance with health and environmental laws. In this regard, the Executive Order requires each Federal agency to make the achievement of environmental justice a part of its mission by identifying and addressing disproportionately high and adverse human health and environmental effects of its programs, policies and activities on minority populations and low-income populations.

Implementation of any of the three training method action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives:

- will result in the accomplishment of training on-post; and
- not result in disproportionately high and adverse human health and environmental effects on minority populations and low-income populations in the surrounding community.

There are no minority or low-income community population concentrations off-post located adjacent to FLW boundaries that will be affected by proposed training and construction activities.

## 5.2.2.14 Economic Development

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Economic Development:

- Economic impact of the realignment on the local and regional economy;
- Recipients of benefits from new jobs created;
- Dependency of area's economy on Fort Leonard Wood;
- Availability and desirability of off-post housing;
- Impact on municipal and county revenues;
- Tax adjustments due to change in demand on public services and infrastructure;
- Commitment of the U.S. Army to the economic viability of the surrounding area;
- Effect of potential contamination on land values;
- Attractiveness of area to clean industries and businesses;
- Fog oil training and the tourism and recreation industries;
- Short-term economic gains versus environmental losses; and
- Economic impacts and projections resulting from the new training program and increase in trainees and students.

However, each of these issues is more closely tied to the relocation of the population, than either the training method to be implemented or the land use and facility plan that will be implemented; therefor these issues are discussed in subsection 5.4.2.14 as part of Step 3 of the analysis of environmental consequences.

## 5.2.2.15 Quality of Life

This subsection examines the potential effects of the alternatives on the quality of life of students, staff and/or members of the surrounding civilian community. As described in Section 3, there are three components of the proposed action. The following paragraphs identify and describe issues of concern in the impact analysis of the Training Methods alternatives. The discussion has been divided into two parts: general **Quality of Life** issues (subsection 5.2.2.15.A) and issues involving **Human Health and Safety** (subsection 5.2.2.15.B). Only alternatives which present potential impacts are discussed. No discussion of an alternative in a section means that no potential impacts associated with that alternative were identified.

Three issues were identified in the analysis of Training Methods. Implementation of the planned BRAC training actions at FLW will result in the following issues with respect to Quality of Life:

- Hunting and fishing access to field training areas;
- Ability of local medical facilities to handle radiological and chemical injuries; and
- Access to museums and associated materials.

Nine issues were identified as having a potential to impact Human Health and Safety. These issues are:

- Fog oil obscurant training;
- Obscurant training with smoke pots;
- Obscurant training with smoke grenades;
- Training with biological materials that simulate biological agents;
- Training with simulated chemical agents;
- Training with toxic agents at the CDTF;
- Disposal of toxic agents at the CDTF; and
- Training with radiological isotopes.

## 5.2.2.15.A Quality of Life

**5.2.2.15.A.1 Issue: *Hunting and Fishing Access to Field Training Areas.*** Fort Leonard Wood lands, at times when they are not closed for military purposes, provide important recreation opportunities. Recreational use in training areas consists primarily of hunting and fishing. The installation is divided into 41 numbered areas, ranging in size from 254 to 4,070 acres (102 hectares to 1,628 hectares). These areas were developed to allow, within mission and safety requirements, maximum access to the installation's varied natural resources. This issue addresses recreation access to field training areas under: TG 1.2 Maneuver Operations, representative of all training actions involving field training; TG 6.3 NBC, Decontamination Advanced Proficiency Test (Toxic Agent); TG 7.2 Obscurant, Employment Operations, Basic (Static); TG 7.3 Obscurant, Employment Operations, Mobile; TG 7.4 Obscurant, Employment Operations, (Field Training); and TG 10.1 Weapons Training.

Due to potentially hazardous military training events, FLW has several regulations controlling the use of Ranges and Training Areas. These restrictions and administrative procedures are designed to ensure that the areas are used in a manner to protect the health and safety of both recreational users and military personnel.

- Fort Leonard Wood Regulation 210-14, Ranges and Training Areas, designates all Ranges and Training Areas as closed and off-limits to the public and unauthorized military and civilian personnel. Any use is prohibited unless coordinated and scheduled by the Directorate of Plans, Training and Mobilization (DPTM). The DPTM identifies, plans, and schedules the use of all Ranges and Training Areas and designates each area as "open" or "closed". The designation remains in effect until DPTM re-schedules the area. During days when a specific Range or Training Area is not scheduled for military use, it is designated as "open" and is made available for non-military and recreational activities.

- Both FLW 210-14 and FLW 210-21 direct that all hunting and fishing be coordinated with the Outdoor Recreation Center. All persons desiring to use FLW for recreational purposes must be thoroughly familiar with the installation hunting and fishing area map and the limitations depicted on the map. Additionally, all hunters and fishermen are required to obtain an appropriate license to use the installation's lands. Campers are required to check-in with the Outdoor Recreation Center prior to using the installation and must camp in designated areas only. Information on which areas are closed or open is obtained by contacting the Outdoor Recreation Center or from a 24-hour recorded telephone message. Information concerning areas closed or open must be obtained the day of entry. During hunting seasons the DPTM and the Outdoor Recreation Center are in constant and continuous coordination to determine which hunting areas will be opened for hunting. The Outdoor Recreation Center coordinates with DPTM to obtain the list of open areas.

- As specified in FLW 210-14, access to cemeteries outside the cantonment area must be coordinated with DPTM.

Enforcement of these regulations is the responsibility of the Law Enforcement Command (LEC), and DPTM. Daily patrols are conducted of closed areas (by the LEC Military Police and Game Wardens, and DPTM Range Control) to ensure no unauthorized persons enter these areas. During training events patrols are conducted more frequently and on a randon basis. In addition, it is also the responsibility of a military unit using a Training Area or Range to also monitor for unauthorized persons or use. Additionally, personnel at Range Control monitor closed ranges daily for unauthorized use. Violators are subject to fines and imprisonment. Open areas are also patrolled daily and monitored for unauthorized activities.

The Outdoor Recreation Center provides copies of FLW 210-21 to all hunters and fishermen and individuals requesting a map. All persons obtaining a FLW hunting or fishing license are required to view an orientation video. Additionally, the Center is staffed with personnel familiar with the rules and regulations specific to FLW, and on the use of FLW facilities for recreational or non-military purposes. This facility is open to the public. Pamphlets and brochures containing information about Missouri (and FLW) natural resources are available. The Outdoor Recreation Center also provides full services for recreational equipment rental. Personnel using equipment must abide by all safety requirements and must have appropriate operational permits or licenses.

The four principal entrances to FLW identify entry into a military use area with all persons being subject to installation regulations. All Range and Training Area entrances have signs identifying the name and number designation of the training site.

Fort Leonard Wood currently has a Clean Air Act air permit to conduct fog oil training. This permit was coordinated with USEPA Region VII and subsequently issued by the MDNR on June 7, 1995. Dispersion modeling was completed to illustrate compliance with air quality standards at the installation boundary. For the purposes of this permit, the cantonment was considered ambient air. The permit contains conditions under which smoke training can be conducted. In addition to these conditions the permit requires monitoring of air, soil and vegetation prior to implementing smoke training on FLW and for two years after training commences.

Regardless of the training alternative selected, FLW will implement the following additional public access restrictions and use requirements for non-cantonment facilities, in order to ensure protection of human health and safety. These procedures will remain in place for all non-cantonment areas, until monitoring data (required by the existing permits) can demonstrate that certain areas outside the cantonment can be excluded from the additional restrictions. It is anticipated that review of the monitoring data with regulatory agencies (as outlined in Appendix K, Summary of Monitoring Programs) as part of the Adaptive Management Strategy will allow the identification of non-cantonment areas that are not potentially affected by proposed training actions. The additional restrictions that will be implemented by FLW, prior to the initiation of smoke training, include the following:

- Expand the Outdoor Recreation Center's Hunting and Fishing Outdoor Use Orientation Program to include all recreational users. All persons not engaged in routine military or DA

civilian/contractor activities will be required to attend the Orientation Program. The current program consists of: (1) videos describing FLW military training, hazards associated with using FLW lands, potential hazards which may be encountered, the proper procedures for checking closed/open areas; (2) informational pamphlets, brochures and maps; and (3) personnel available to address questions. This program will be expanded to provide information for all types of recreational users and persons visiting FLW Range and Training Areas. Patrol statistics would be used to judge the overall effectiveness of any additional access restrictions established to protect human health from fog oil smoke training. The description of military training will be expanded to include various types of training completed by the Military Police and Chemical schools, including obscurant (smoke) training.

- Signs will be placed at three of the four primary Installation entrances (the three that enter near Range and Training Areas) and a fourth sign will be placed along FLW Range Access Road 1 near the southern edge of the cantonment where the ambient air boundary ends. Signs will inform persons that they are required to visit the Outdoor Recreation Center where pertinent information can be obtained.

- Signs will be placed at entrances of the smoke training areas in accordance with existing FLW regulations.

- Information will be maintained at the FLW Information/Welcome Center, and at locations where the public may seek additional information such as the FLW telephone information service and the Public Affairs Office, directing visitors to the Outdoor Recreation Center. Information dissemination will be incorporated, as appropriate, into the Public Awareness Plan scheduled to be developed and implemented prior to commencing smoke training.

- Remind visitors that they are on a military installation and must abide by the rules and regulations of FLW. Inform visitors that there is a potential for hazardous situations to be present, and that FLW will continue to protect public health and safety.

- Provide data necessary for DPTM to determine which Ranges and Training Areas are to be closed during smoke training sessions, and provide date to demonstrate that certain areas outside the cantonment can be excluded from this process.

- Establish appropriate safety zones adjacent to the smoke training areas. Safety zones will be established based on atmospheric stability and prevailing wind conditions, human health exposure limits, and appropriate mathematical modeling and/or empirical data or other appropriate method. Appropriate signage along with barriers, such as gates or cables, will be placed on all entry roads within these zones or at a greater distance to restrict public access. These measures will be established prior to the beginning of a smoke training event. Smoke training areas will be included in the current procedure to conduct daily patrols and the patrols which are provided on a more frequent random basis while training is occurring. The military unit responsible for using a smoke training area will also monitor for unauthorized persons or use consistent with standard military procedures. It is important to note that the largest quantity of smoke generation occurs during mobile or field training exercises. During these events smoke is actually generated for approximately 1 hour or less.

Additionally, as discussed in Volume III, Appendix L, the Army will implement the Public Awareness Program to inform the public in the surrounding community and those living, working, or visiting FLW about fog oil obscurant training, and the potential health risks associated with exposures to fog oil. Subsection 5.2.2.15.B.1 (below) provides additional information on the potential human health effects of fog oil obscurant training.

**5.2.2.15.A.1.1 RCP Alternative.** The presence of FLW and its associated BRAC activities will result in mixed consequences for recreation use of the area. The expanded mission of the installation will result in increased field maneuver training under TG 1.2. Since the RCP Alternative, OPTM (Army's Proposed

Action) Alternative and EPTM Alternative are all accomplished by the same training method to achieve TG 1.2, the impacts will be the same. Reallocation of existing range and training areas will result in increased use of existing areas and will limit recreation access while training is being conducted.

Implementation of TG 6.3 will result in the establishment of 985-foot (300-meter) (radius) restricted access safety zone near the CDTF. Recreational use of this area, immediately surrounding the CDTF (Project 45893) site, will be prohibited following the construction of the CDTF.

- **Direct Impacts.** As with TG 1.2, recreation access to field training areas will be limited due to TG 7.2, Obscurant, Employment Operations, Basic (Static). In addition to limitations due to increased field maneuver activity, access will be restricted outside the immediate area of the military activities due to obscurant drift. Recreation participants will be kept out of any area affected by the obscurant cloud until the cloud dissipates. This restriction is due to limited visibility and limiting access as with any area being used for training. A lesser amount of fog oil is used for this instruction than for other training actions. With this alternative, 20,000 gallons (76,000 liters) per year is used for this training action versus 41,500 gallons (157,700 liters) per year for TG 7.3 and 64,000 gallons (243,200 liters) per year for TG 7.4. Due to the relatively small amount of obscurant produced, this alternative is expected to present only minor impacts.

  As with TGs 1.2 and 7.2, recreation access to field training areas will be limited due to TG 7.3, Obscurant, Employment Operations, Mobile. In addition to limitations due to increased field maneuver activity, access will be restricted outside the immediate area of the military activities due to obscurant drift. Recreation participants will be kept out of any area affected by the obscurant cloud until the cloud dissipates. A greater amount of fog oil is used for this instruction than for the OPTM (Army's Proposed Action) and EPTM, which are accomplished by the same training practice. With this alternative, 41,500 gallons (157,700 liters) per year is used for this training method versus 20,000 gallons (76,000 liters) per year for the OPTM (Army's Proposed Action) and EPTM. In addition, obscurant is produced from moving sources in this training, resulting in a greater area affected by the obscurant cloud. Due to the greater amount of obscurant produced, combined with the mobile source, adverse effects on recreation access are expected to occur with the implementation of the RCP Alternative.

  As with TGs 1.2, 7.2 and 7.3, recreation access to field training areas will be limited under TG 7.4, Obscurant, Employment Operations, (Field Training). In addition to limitations due to increased field maneuver activity, access will be restricted outside the immediate area of the military activities due to obscurant drift. Recreation participants will be kept out of any area affected by the obscurant cloud until the cloud dissipates. A greater amount of fog oil is used for this instruction than for the OPTM (Army's Proposed Action) Alternative or EPTM Alternative. With this alternative, 64,000 gallons (243,200 liters) per year is used for this training method versus 56,000 gallons (212,800 liters) per year and 29,000 gallons (8,700 liters) per year for the OPTM (Army's Proposed Action) and EPTM, respectively. In addition, obscurant is produced from moving sources in this training, resulting in a greater area affected by the obscurant cloud. Due to the greater amount of obscurant produced, combined with the mobile source, adverse effects on recreation access are expected to occur with the implementation of the RCP Alternative.

  Under TG 10.1, Mark 19 rounds will only be used on targets within an existing dud area. There will be no need to expand the existing dud area.

#### 5.2.2.15.A.1.2 OPTM (Army's Proposed Action) Alternative

- **Direct Impacts.** As with the RCP Alternative, recreation access to field training areas will be limited due to implementing the OPTM (Army's Proposed Action) Alternative to accomplish TG 7.2. In addition to limitations due to increased field maneuver activity, access will be restricted outside the immediate area of the military activities due to obscurant drift. Recreation participants will be kept out of any area affected by the obscurant cloud until the cloud dissipates. A lesser amount of fog oil is used for this instruction with this training method; 8,500 gallons (32,300 liters)

per year is used for this training action versus 20,000 gallons (76,000 liters) per year for the RCP Alternative. Due to the relatively small amount of obscurant produced, this alternative is expected to present only minor impacts.

As with the RCP Alternative, recreation access to field training areas will be limited due to implementing the OPTM (Army's Proposed Action) Alternative to accomplish TG 7.3 . In addition to limitations due to increased field maneuver activity, access will be restricted outside the immediate area of the military activities due to obscurant drift. Recreation participants will be kept out of any area affected by the obscurant cloud until the cloud dissipates. A lesser amount of fog oil is used for this instruction with this training method; 20,000 gallons (76,000 liters) per year is used for this training action versus 41,500 gallons (157,700 liters) per year for the RCP Alternative. Due to the relatively small amount of obscurant produced, this alternative is expected to present only minor impacts.

As with the RCP Alternative, recreation access to field training areas will be limited due to implementing the OPTM (Army's Proposed Action) Alternative to accomplish TG 7.4. In addition to limitations due to increased field maneuver activity, access will be restricted outside the immediate area of the military activities due to obscurant drift. Recreation participants will be kept out of any area affected by the obscurant cloud until the cloud dissipates. A lesser amount of fog oil is used for this instruction with this training method; 56,000 gallons (212,800 liters) per year is used for this training action versus 64,000 gallons (243,200 liters) per year for the RCP training method. In addition, obscurant is produced from moving sources in this training, resulting in a greater area affected by the obscurant cloud. Due to the amount of obscurant produced, combined with the mobile source, adverse effects on recreation access are expected to occur with the implementation of the OPTM (Army's Proposed Action) Alternative.

Implementation of this training method alternative will also require the establishment of a 985-foot (300-meter) (radius) restricted access safety zone near the CDTF as discussed in the RCP Alternative. Recreational use of this area, immediately surrounding the CDTF (Project 45893) site, will be prohibited following the construction of the CDTF.

#### 5.2.2.15.A.1.3 EPTM Alternative

- **Direct Impacts.** As with the RCP and OPTM (Army's Proposed Action) Alternatives, recreation access to field training areas will be limited due to implementing the EPTM Alternative to accomplish TG 7.2. In addition to limitations due to increased field maneuver activity, access will be restricted outside the immediate area of the military activities due to obscurant drift. Recreation participants will be kept out of any area affected by the obscurant cloud until the cloud dissipates. A lesser amount of fog oil is used for this instruction with this training method; 1,000 gallons (3,800 liters) per year is used for this training action versus 20,000 (76,000 liters) and 8,500 gallons (32,300 liters) per year for the RCP and OPTM (Army's Proposed Action) Alternative, respectively. Due to the relatively small amount of obscurant produced, this alternative is expected to present only minor impacts.

  As with the RCP Alternative, recreation access to field training areas will be limited due to implementing the EPTM to accomplish TG 7.3. In addition to limitations due to increased field maneuver activity, access will be restricted outside the immediate area of the military activities due to obscurant drift. Recreation participants will be kept out of any area affected by the obscurant cloud until the cloud dissipates. A lesser amount of fog oil is used for this instruction with this training method; 20,000 gallons (76,000 liters) per year is used for this training action versus 41,500 gallons (157,700 liters) per year for the RCP training method. Due to the relatively small amount of obscurant produced, this alternative is expected to present only minor impacts.

  As with the RCP and OPTM (Army's Proposed Action) Alternatives, recreation access to field training areas will be limited with implementation of the EPTM Alternative to accomplish TG 7.4. In addition to limitations due to increased field maneuver activity, access will be restricted outside

the immediate area of the military activities due to obscurant drift. Recreation participants will be kept out of any area affected by the obscurant cloud until the cloud dissipates. A lesser amount of fog oil is used for this instruction with this training method; 28,500 gallons (108,300 liters) per year is used for this training action versus 64,000 (243,200 liters) per year and 56,000 gallons (212,800 liters) per year for the RCP and OPTM (Army's Proposed Action) Alternatives, respectively. Due to the amount of obscurant produced, combined with the mobile source, adverse effects on recreation access are expected to occur with the implementation of the EPTM Alternative.

Implementation of this training method alternative will also require the establishment of a 985-foot (300-meter)meter (radius) restricted access safety zone near the CDTF as discussed in the RCP Alternative. Recreational use of this area, immediately surrounding the CDTF (Project 45893) site, will be prohibited following the construction of the CDTF.

**5.2.2.15.A.2 Issue: *Ability of Local Medical Facilities to Handle Radiological and Chemical Injuries.*** The scoping process identified a concern about the ability of local medical facilities to deal with radiological and chemical injuries. There is a potential for these injuries to occur with the implementation of the RCP Alternative for TGs 6.1, NBC Procedures and 6.4, NBC Survival Recovery.

**5.2.2.15.A.2.1 RCP Alternative.** The current training practice *available* at Fort McClellan, through FMC's NRC license, incorporates exterior use of open radioisotopes as detection targets. It is important to note, however, that the exterior radioisotope training has never been conducted. If this training practice is relocated to FLW, it is similarly unlikely that it would be utilized. In the event that exterior training use of radioisotopes were to be employed, an NRC license provision similar to FMC's would have to be obtained.

Several factors mitigate the potential for injury from open radioisotopes. Initially, a series of events would have to take place in order for a possibility of radiological injury to exist. The Army would have to decide to change its policy of not using open radioisotopes in exterior training situations. An accidental release would have to occur. And, a passerby would have to be exposed in an extreme manner, such as ingestion.

Once the decision to use open radioisotopes is made, protocols for handling radioisotopes are extremely rigid and sophisticated. The quantity to be used would be weighed on a electronic microbalance before being taken to the field, placed in a sealed container, transported for use, and reweighed upon its return. Any unaccounted for amount would cause the training unit to return immediately to the training site, locate the amount, and conduct a clean sweep of the area.

In addition, quantities of radioisotopes are small. Amounts used for training are less than or comparable to the amounts found in common household items such as smoke detectors and camping lanterns. These isotopes average approximately 10 microcuries each, and are similar to the 40 microcuries of Americium 241 which could be found in a household smoke detector.

The possibility of an accidental chemical exposure is remote. In addition, refer to subsection 5.2.2.2.2.1 for a discussion of CDTF design elements that mitigate the possibility of chemical exposure.

In the unlikely event of a radiological or chemical injury, personnel will be treated at the General Leonard Wood Army Community Hospital. At the Hospital, specialists well-trained in radiological and chemical exposure medicine are on-hand and are available to treat any injury incurred due to an accidental exposure. Treatment at local medical facilities should not be required.

**5.2.2.15.A.2.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** With implementation of the training method determined to be both the OPTM and EPTM, the impact of a possibly limited ability of local medical facilities to handle radiological injuries is mitigated by avoiding the potential by not using open radioisotopes in exterior training. No possibility for accidental exposure to open radioisotopes would exist.

The potential for impacts due to accidental chemical exposure with the implementation of either of these alternatives is the same as with the RCP Alternative.

**5.2.2.15.A.3 Issue: *Access to Museums and Associated Materials.*** Access to museum artifacts and associated materials under TG 9.2 Specialized/Classified and Museum. Museums are provided to give access to historical information, museum displays and associated materials for students, staff and members of the civilian community. Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW.

- **Direct Impacts.** The RCP, OPTM (Army's Proposed Action) and EPTM Alternatives all will have beneficial effects, although accomplished by different methods. The museums of the Chemical School, Military Police School, as well as the existing Engineer School Museum, will be open and available to the general public, as well as students and staff at FLW. Because of this policy, access to historical, informational and educational materials will be increased.

## 5.2.2.15.B Human Health and Safety

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Human Health and Safety:

- Fog oil obscurant training;
- Training with smoke pots, smoke grenades and illumination rounds;
- Training with biological materials that simulate biological agents;
- Training with chemical agent simulants;
- Training with toxic agents at the CDTF;
- Disposal of decontaminated by-products of toxic agent training at the CDTF;
- Training with radiological isotopes;
- Release of unburned fuels from FFE deterrents training.

**5.2.2.15.B.1 Issue: *Fog Oil Obscurant Training.*** The use of obscurant smokes to conceal ground troops, equipment and facilities from the enemy has been employed as a combat strategy since before World War I. The primary method used by the military to produce obscurant smokes is smoke generation with fog oil. Training in the production of fog oil smoke and strategic application of smoke in the field, is necessary to insure combat readiness. Fog oil smoke production involves the instantaneous vaporization of liquid fog oil by heat within specially designed generators. The vaporized oil is propelled from the generator into the atmosphere where it immediately cools and condenses into a multitude of tiny, 0.8- to 1-μm sized oil droplets. The obscurant cloud, termed "smoke," is in reality a cloud of very small oil droplets. During training, military personnel (trainees and instructors) are exposed to fog oil smoke. A public concern expressed in the scoping comments is the potential for exposure of fog oil smoke to individuals located on-post and off-post.

The preponderance of evidence on the health effects of smoke generated with Standard Grade Fuel-2 (SGF-2) fog oil manufactured after 1986, in accordance with military specification, MIL-F-12070C, Amendment 2 and specifications thereafter, indicate there is limited potential for adverse effects to humans (COE KC, 1997d). Toxicological research demonstrates that the SGF-2 fog oil currently used has low toxicity when ingested, presents minimal toxicity from dermal exposure, and has limited potential for pulmonary effects unless the Threshold Limit Value-Time Weighted Average (TLV-TWA) of 5 $mg/m^3$ is exceeded for prolonged periods of time (COE KC, 1997d; and Palmer, 1990). The TLV-TWA of 5 $mg/m^3$ is a concentration of mineral oil mist that is considered safe to breath by workers in industrial settings for up to 8 hours per day, 5 days per week for a worker's career (ACGIH, 1995). Fog oil is classified as a mineral oil and because it is subjected to the same severe treatment used to produce industrial mineral oils, the 5 $mg/m^3$ standard for industrial workers is considered applicable to soldiers involved in fog oil obscurant training.

Personnel monitoring by Skrutskie (1993) over an 8-hour fog oil obscurant field training exercise demonstrated personnel exposure levels between 0.0-1.98 mg/m$^3$. This monitoring indicated the TLV-TWA of 5 mg/m$^3$ would not be exceeded in the field. In another study, Young (1989) collected breathing zone samples from soldiers and Cadre involved in both field and generator operation and maintenance training ("static training"). Fog oil exposures during field training were generally under the 5 mg/m$^3$ TLV-TWA for mineral oil. However, exposures of personnel in close proximity to generators was greater during static training, where more than 50 percent of the Cadre and students alike experienced exposures in excess of the TLV-TWA of 5 mg/m$^3$ when one hour exposures were averaged over an 8 hour period.

Fog oils manufactured before 1986 typically had high concentrations of toxic and carcinogenic aromatics, including PAHs (Katz, 1980), and posed a potential health threat to exposed individuals. In 1986 military specifications for SGF-2 were altered to require manufacturers to remove carcinogens and potential carcinogens from the oil (DA, 1986a). Fog oil used at FLW will, at a minimum, comply with a newer specification (DA, 1995b) which requires manufacturers to certify the oils they produce show no evidence of carcinogenicity based on required testing. Carcinogenicity of the oil is attributed to its polynuclear aromatic hydrocarbon (PAHs) constituents. Also, the noncarcinogenic toxicity of petroleum derived fuels and mineral oils are mostly attributable to the aromatic fraction (includes PAH) as opposed to the aliphatic fraction (Neff, 1979; and ATSDR, 1995). Pulmonary effects (i.e., lipoid pneumonia) can result from exposure to the aliphatic fraction of the oil and can occur following repeated exposures to very clean "white" mineral oils which are of pharmaceutical grade. PAHs and other aromatics are reduced to noncarcinogenic levels by special refining methods.

Military manufacturing specifications for fog oil have changed little since the specification was issued in 1986. The most recent proposed change is currently undergoing internal review by the military (DA, 1995b). The 1995 proposal differs from the 1986 specification by requiring manufacturers to test each batch of processed fog oil for its carcinogenicity with a mouse skin painting test or for its potential carcinogenicity by a Modified Ames Test (to assess mutagenicity) in conjunction with a Food and Drug Administration "White Oil Purity" test to demonstrate the lack of PAHs. This proposed specification, when adopted by the Army, will provide greater assurance that manufacturers are consistently providing low toxicity fog oils which exhibit no carcinogenicity. The most recent proposed specification is expected to be approved by the Army in 1997 and will be the specification for fog oil used at FLW when fog oil obscurant training is initiated in 1999.

Several manufacturers are used by the Army to produce fog oil. The hydrocarbon composition of fog oil can vary considerably between manufacturers due to the base oil stock used and differences in manufacturing processes. The fog oil Material Safety Data Sheet (MSDS) developed by Industrial Oils Unlimited identifies the general composition of SGF-2 fog oil as mineral oil, petroleum distillate, and hydrotreated heavy naphthenic oils (IOU, 1989). To account for this variability, the Army proposed a new manufacturing specification (expected to be approved in 1997), which is detailed in the fog oil human health literature review contained in Appendix E of the preliminary human health risk evaluation (PRE) (COE KC, 1997c). A common element for all fog oils manufactured for the Army is that they are "severely treated" to significantly reduce or remove toxic PAHs. While some compositional variations are anticipated for the fog oils manufactured, there is considerable research evidence that mineral oils which have been subjected to severe treatment during manufacturing, exhibit low toxicity.

Research evidence indicates that toxic and carcinogenic PAHs are not created due to heating fog oil in smoke generators used by the Army (COE KC, 1997c). Fog oil smoke and liquid fog oil were analyzed for over 100 aliphatic and aromatic compounds of health significance (COE KC, 1997c). The hydrocarbon composition of liquid SGF-2 fog oil was compared to the composition in smoke to determine if internal heat of the M56 turbine and M157 pulse jet generators caused a modification of existing PAH composition and/or creation of new PAHs in smoke. The M56 and M157 generators were selected for the monitoring study because they are the two generators that will be used in fog oil obscurant training at FLW. Analytical results of the semivolatile component (contains the PAH fraction) of fog oil provide strong evidence to indicate that the heat of the generator did not alter the PAH chemical composition of the oil. The gas chromatographic (GC) scans of the semivolatile compounds in liquid fog oil and smoke were nearly identical, as were the concentrations of individual semivolatile compounds in smoke and liquid fog

oil. Had alterations occurred, the GC scans would have been noticeably different and the concentrations of PAHs in smoke would have been significantly higher or lower.

The most advanced state-of-the-art analytical methods were used to resolve the hydrocarbons of human health concern in the fog oil for the preliminary human health risk evaluation (PRE) (COE KC, 1997c). Mineral oils, such as fog oil, contain thousands of different hydrocarbon compounds, but it is a relatively small fraction of these that are of environmental and human health concern. It is therefore, not necessary to resolve and quantify all compounds in a complex petroleum mixture to assess potential health and environmental effects. The compounds that were analyzed in the fog oil (COE KC, 1997c) included all those which are generally agreed by hydrocarbon toxicologists to be biologically significant.

Fog oil is not burned in fog oil generators to produce "smoke". Instead it is instantaneously vaporized in the generator and when the vapor is propelled into the air, it condenses into tiny droplets making an obscurant cloud. That portion of the fog oil smoke which was not identified when analyzing for compounds of concern in the PRE (COE KC, 1997c), is undoubtedly comprised mainly of cyclic, branched and straight-chained alkanes in the C14 to C22 range. These compounds are significantly less toxic than the aromatics, alkenes, and short-chain alkanes which were quantitatively assessed in the PRE (Kostecki and Calabrese, 1990). The long-chain alkanes which were not evaluated in the PRE are ubiquitous contaminants in all urban and suburban environments. They are present at many hazardous waste sites and probably all petroleum-contaminated sites, yet neither USEPA nor the Agency for Toxic Substances and Disease Registry (ATSDR) have identified them as priority toxic contaminants. No alkanes in the C14 to C22 range are listed in any of the following toxicity databases: 1) USEPA Integrated Risk Information System (IRIS); 2) USEPA's Health Effects Assessment Summary Tables (HEAST); 3) USEPA's Target Compound List (TCL); and 4) ATSDR's Priority List of Hazardous Substances.

Based on the analytical information on the chemical constituents in fog oil and smoke, a preliminary human health risk evaluation (PRE) was conducted (COE KC, 1997c). The PRE followed USEPA methodology and used highly simplified and conservative (health-protective) exposure assumptions that, by design, overestimate adverse health effects. At the sampling station located 1.65 feet (0.5 meter) from the generator smoke exhaust port, five carcinogenic compounds were detected. Two of the five (1,3 - butadiene and benz(a)anthracene) were not present in the liquid fog oil. These two compounds are commonly associated with diesel fuel, and they were therefore assumed to have come from the incomplete combustion of the diesel fuel used to operate the generators. The carcinogenic compounds analyzed in fog oil were among those commonly found in petroleum fuels and gasolines, but were present in much less concentration. The carcinogenic risks and noncarcinogenic toxic effects were evaluated by the PRE to determine potential health effects for all chemicals of potential concern detected in fog oil smoke.

The fog oil PRE used toxicity values developed by the USEPA when calculating exposure risks from inhaling fog oil smoke (COE KC, 1997c). The published toxicity values have been adjusted downward by USEPA to protect sensitive individuals in a human population, including women, children and the elderly. Although protective of very sensitive human receptors, they do not protect the rare, ultra-sensitive individual that may react to any number of different airborne exposures, whether man-made or produced by nature. Although the PRE used exposure times, frequencies, and durations estimated for military personnel involved with the Chemical School as a career, the results represent more than just a "workplace" estimate of risk. The exposure times, durations and concentrations used in the PRE are estimated to be greater than those exposures anticipated for the general public. The toxicity values used in the PRE for the compounds of concern found in fog oil were obtained from USEPA toxicity data bases (USEPA, 1995b and 1996; as referenced in the PRE).

The PRE determined that sustained exposure to fog oil smoke at concentrations less than 5 $mg/m^3$ is associated with an insignificant level of toxicity and carcinogenic risk. Conversely, the PRE determined that sustained exposures greater than 5 $mg/m^3$ may be associated with an significant level of toxicity and/or carcinogenic risk (COE KC, 1997c). The 5 $mg/m^3$ mineral oil mist concentration is also the TLV-TWA established by OSHA and ACGIH for protection of workers (ACGIH, 1995).

The SGF-2 fog oil used in the preliminary human health risk evaluation was also tested for mutagenicity using a Modified Ames test procedure (COE KC, 1997c). In general, materials that are found to be mutagenic are considered to have the potential to cause carcinogenicity in man. The results of the Modified Ames test were negative for mutagenicity.

In their review of the Draft EIS, the USEPA questioned whether chemical analysis of liquid fog oil and fog oil smoke conclusively demonstrated that fog oil was unaltered by heat of the generators. The USEPA recommended that modified mutagenicity tests be conducted on samples of fog oil smoke after it leaves the generator to confirm that significant transformations do not occur. The USEPA requested this information be incorporated into the overall Monitoring Plan/Adaptive Management Strategy for the project. Despite the lack of sufficient evidence to indicate mutagenicity of fog oil, FLW nonetheless agreed to USEPA's request, and undertook a series of test to confirm earlier conclusions.

Thus, the Army started a series of studies in November 1996, which focus on the development of a method to collect an adequate quantity of obscurant smoke after it passed through the generators (M56 and M157). There are no established, USEPA approved methods available for collection of whole oil aerosols in quantities sufficient to conduct mutagenicity testing using a Modified Ames procedure. The initial studies were specifically conducted to identify a suitable method for collecting an adequate sample of fog oil from the obscurant cloud to support mutagenicity testing.

Trials were run at Aberdeen Proving Ground using fog oil stock available at that location. The fog oil used in these trials had been purchased under existing military specification that requires that no carcinogenic or potentially carcinogenic constituents are present (DA, 1986a). The first trial tested the capabilities of the Greenberg/Smith impinger. The impinger could not collect and adequate sample at distances over 5 meters from the generator source. In a second trial, samples were collected with impingers at 5 meters, and with quartz fiber filters at 25 meters. Samples were then removed from the filters by Soxhlet extraction in methylene chloride.

Modified Ames tests were performed on samples collected during these methodology trials. The results of the Modified Ames tests indicated that the fog oil (sampled before smoke generation) had an mutagenicity index (MI) of 2.2. The composite cloud samples (background plus fog oil plus exhaust) displayed varying MIs. These results are very preliminary as they were done primarily to develop aerosol sample collection methods and are not fully predictive of smoke training to be conducted at FLW. Nor was the other primary component of health risk, exposure levels, considered.

The pending military specification (Revision E; DA, 1995b), which is expected to be adopted in 1997, requires manufacturers to test fog oil for carcinogenicity with a mouse skin painting test or for mutagenicity and maximum aromatic content by a Modified Ames test in conjunction with a U.V. absorbance test for PAHs. The fog oil to be used at FLW will, at a minimum, be manufactured to comply with the new specification (DA, 1995b). If the latter tests are used, the fog oil must have an MI of 1 or less.

Based on the trials conducted to date, the Army, with USEPA as a technical consultant, is developing an appropriate methodology to collect and differentiate among the varying contributions to the MI. In addition, the Army is currently procuring fog oil which will be certified in accordance with the new specification. When these two tasks are completed, the Army will conduct a final test using the new specification oil (DA, 1995b) which will be used at FLW, and the best available collection technique.

The results of this additional mutagenicity testing were not available in time to be included in the FEIS. Regardless of the availability of this additional confirmatory testing requested by USEPA, this FEIS presents a more than adequate basis for the decision maker to select an alternative. Information which this FEIS relies upon in reaching this conclusion is detailed in the remainder of this section. Considering the need to develop a sound scientific protocol to perform the confirmatory tests requested by USEPA and the difficulties faced in development of this protocol, the testing could not be accomplished by the time of completion of the FEIS. The need to complete the FEIS analysis and make a final decision is dictated by the strict timelines established to accomplish the directed BRAC relocations. In addition, the exorbitant costs associated with further delay of the FEIS are not justified considering the sufficient evidence already

available to the Decision Maker on this issue. The confirmatory test results are not expected to further assist the Decision Maker in making a choice among the alternatives, and will instead be used and evaluated in the Adaptive Management Strategy process described in Appendix K of the FEIS, prior to commencing training at FLW.

The Army has developed personal protection policies which carefully guard the health and safety of those involved in fog oil obscurant training. The Army's "Smoke Operations" manual FM 3-50 instructs individuals involved in smoke training to "wear respiratory protection (mask) when in high concentrations of oil smoke or after 4 hours in low concentration of oil smoke (haze)." High concentration of oil smoke is defined in the Army's July 1994, "Health Hazard Assessment Report on the XM56 Smoke Generator System" as "visibility less than 50 meters." The 1994 Hazard Assessment Report further requires respiratory protection when exposure to smoke haze (i.e., visibility greater than 165 feet (50 meters)) is anticipated for a duration of 4 hours or greater and any time exposure to smoke produces breathing difficulty.

The Army policy for respiratory protection during fog oil obscurant training will provide ample assurance that exposures will not exceed the 5 $mg/m^3$ TLV-TWA for mineral oil (e.g., fog oil) mist as established by ACGIH and OSHA. This is particularly true when considering the OSHA/ACGIH 5 $mg/m^3$ concentration has been determined to be safe even when repeatedly breathed 8 hours per day and 5 days per week over a working career.

Fog oil exposure concentrations greater than 5 $mg/m^3$ TLV-TWA are seldom anticipated for military personnel during training because the majority of time is spent outside the obscurant cloud and/or upwind rather than downwind of the generators producing the fog oil obscurant. The primary objective of training is to teach soldiers to operate generators and control the obscurant cloud. Training to accomplish these primary objectives does not involve the blanketing of soldiers with a fog oil obscurant cloud. On occasion, however, training is conducted to teach soldiers to maneuver within a fog oil cloud and in this case soldiers would be instructed to wear respiratory protection if they found themselves in high concentrations of fog oil. The time that fog oil smoke is produced during a normal training exercise is seldom longer than 30 minutes; more than 60 minutes of smoke production during a training event would be unusual.

Fog oil dispersion modeling that did not account for use rates, training locations and meteorological restrictions under which training will be conducted at FLW, predicted 3 and 300 $\mu g/m^3$ concentrations (of fog oil) at 40 km from a generator (Driver,1993). The dispersion model data indicate the potential for fog oil training to result in low exposures at great distances downwind of the training sites. The modeling results at 40 km in the Driver report are theoretical and do not account for training restrictions that will be implemented at FLW. The model would have predicted a concentration at any distance if it were "asked" to provide it. That does not mean these concentrations will actually be present at 40 km. To attempt field verification at 40 km would be extremely difficult, if not impossible. It is not expected that long-term exposures at the 3 to 300 $\mu g/m^3$ concentration will ever occur, given: 1) the high degree of dispersion predicted by the air model used for the FLW fog oil training permit; 2) the intermittent nature of training events which does not represent the type of continuous emission source required for long-term, low level exposures; and 3) restrictions placed in the FLW fog oil training permit which are designed to direct the fog oil obscurant cloud away from the general public.

Modeling of fog oil dispersion was conducted in conjunction with the FLW air permit for fog oil training. A copy of the fog oil air permit is provided in Volume III, Appendix J of the FEIS. Discussions of the modeling and results are found in subsections 5.2.2.3.7 and 5.5.3.3.3 of the EIS. The Gaussian steady state model, used a fog oil consumption rate of 481 gallons per hour (GPH) and determined dispersion from four different FLW locations where training will be conducted. This fog oil use rate is the daily amount allowed under the current FLW air permit for fog oil training. Modeling was conducted for the different meteorological conditions and wind states allowed by the air permit for training. The model predicted concentrations at the edge of the FLW boundary and at the edge of the on-post cantonment area of fog oil would not exceed 0.03 $mg/m^3$ (30 $\mu g/m^3$). The model assumed 30 percent of the fog oil compounds will volatilize from the fog oil by the time it reaches the FLW boundary and cantonment area.

To more conservatively estimate maximum total fog oil concentration at these boundaries, the volatile fraction was added to the 30 $\mu g/m^3$ concentration, resulting in a total concentration of 43 $\mu g/m^3$.

In support of the air quality impact analysis for the EIS, additional modeling was performed to estimate concentrations for fog oil use for a daily and hourly rate of 1,200 GPH and 1,900 GPH. The OPTM and EPTM Alternatives specify a 24-hour fog oil maximum use limit of 1,200 gallons, and the RCP Alternative specifies a maximum use of 1,900 gallons per day. When 1,200 and 1,900 gallons are used in one hour to generate fog oil obscurant, the total maximum concentrations (includes the volatile and non-volatile fractions) predicted by the model at the FLW boundary and at the boundary of the cantonment area are less than 95 and 149 $\mu g/m^3$, respectively. Given that the concentration predicted using the highest daily use rate of 1,900 gallons per day was 149 $\mu g/m^3$ the concentration at the installation boundary or the cantonment boundary would be 34 times lower than the level considered safe for workers in industry to breath for 8 hours per day, 40 hours per week for their entire working careers (ACGIH, 1995). The estimated concentration predicted using the OPTM and EPTM Alternatives would be 53 times lower than the level considered safe for workers in an industrial setting. Human health effects are not anticipated for the general population in the cantonment area and for those individuals beyond the facility boundary, from the very low concentrations of fog oil predicted by the model. As previously stated, if the general public is inadvertently exposed to fog oil, the exposures are anticipated to be infrequent and of short duration.

Individuals positioned away from fog oil training areas, but within the boundaries of Fort Leonard Wood, and those outside the facility boundary are not anticipated to be exposed to fog oil at concentrations that would pose a health risk. Factors which serve to assure insignificant human exposures beyond training ranges are: 1) training ranges are strategically positioned to reduce the possibility of significant fog oil exposures to individuals in cantonment areas and at off-post locations; 2) the fog oil operating permit restricts the wind direction and meteorological conditions under which training is allowed to limit the possibility of the obscurant cloud from reaching on-post cantonment areas and the FLW boundary (subsection 5.2.2.3.7); 3) the duration of fog oil training events is limited and seldom exceeds 30 minutes; and 4) fog oil obscurant clouds disperse rapidly to low concentrations that will not be harmful. The fog oil operating permit also specifies that training shall not contribute to a safety hazard to air traffic or vehicular traffic on highways accessible to the public. To assure compliance with conditions of the permit, observers will be positioned at strategic places around the training area to monitor wind conditions and obscurant cloud movement.

Compliance with fog oil permit conditions will serve to greatly reduce the potential for exposure to the general population outside of training areas. As part of the fog oil training Air Permit, monitoring (as summarized in Appendix K of the FEIS, Vol. III), will be conducted at FLW prior to and concurrent with fog oil training. It is anticipated that monitoring will confirm safe levels in the cantonment areas and off-post. The Adaptive Management Strategy plan (also summarized in Appendix K in the FEIS, Vol. III) will be used to correct any concerns identified during monitoring. Finally, the Public Awareness Program (Appendix L of the FEIS, Vol. III) will be used to inform the public on issues of concern. Also, see the response to comment Ozark Chapter Sierra Club comment number 25 (G-OCSC.25) located in Volume II of the EIS for additional discussion of chronic effects.

The potential for toxicity due to dermal exposure to fog oil smoke is not anticipated. The primary reasons for no expected dermal toxicity are: 1) the depositional amounts of fog oil onto surfaces (skin, foliage, soils, etc.) resulting from fog oil obscurant clouds are so minute that they have defied measurement in the field using sensitive gas chromatographic analysis (Liljegren, 1988; and DeVaull, 1989); deposition has only been predicted (but not verified) by deposition models which calculate 0.01 $g/m^2$ within meters of the generators and much less deposition at further distances (COE KC, 1997b); and 2) the military manufacturing specifications for fog oil require rigorous processing to produce oil that exhibits no carcinogenicity and which is similar in toxicity to mineral oil used by man for medicinal purposes. The Material Safety Data Sheet (MSDS) developed by Industrial Oils Unlimited (IOU) warns of the potential for mild skin rash or irritation when liquid oil contacts skin surfaces and recommends washing upon exposure (IOU, 1989).

**Potential human health effects and those estimated for wildlife (including T & E species).**

Potential chronic inhalation effects of fog oil smoke were projected for T & E species and to certain other wildlife at FLW in two ecological risk assessments (COE KC, 1997b; and FLW, 1996g). They are discussed in subsections 5.2.2.11.A and 5.2.2.11.B.4. The T & E risk assessment also predicted potential effects to bald eagles from lifetime ingestion of prey containing fog oil on the prey surfaces and estimated inhalation effects of TPA smoke (from pots and grenades) to T & E species.

The assessment of potential human health effects from exposure to fog oil smoke did not predict chronic inhalation effects, nor were effects predicted from long-term ingestion of food which may have depositional amounts of fog oil on surfaces. The primary reasons for these differences are summarized as follows:

- The duration of exposure for wildlife and T & E species is greater than for humans. Wildlife and T & E species have the potential to spend a large portion of their life in exposure areas. The only humans close enough to the smoke which have the potential to receive fog oil exposures that may exceed health impacting concentrations are those involved in training. Obscurant smoke training events are finite in duration (less than one hour) and are not considered lifetime exposures.

- The T & E and wildlife species exposure assessment assumed fog oil smoke was independent of wind direction, whether the species was perching, foraging, hibernating, nesting, etc. For example, when a bat is foraging in areas of FLW or hibernating in a cave, the smoke plume was always assumed to be present at some concentration.

- Other wildlife and T & E species were assumed to carry out their normal life cycle activities at FLW without avoidance of fog oil and TPA smoke plumes. A combination of this assumption and the assumption that smoke plumes were always directed toward wildlife species greatly increases the amount of predicted exposure.

- Soldiers involved in fog oil training have the ability to consciously limit exposures by such actions as: 1) conducting training under restricted meteorological conditions designed to limit human exposures outside of training areas to levels which do not pose a health risk; 2) the wearing of respiratory protection by soldiers in training areas where fog oil concentrations may exceed health standards; and 3) positioning themselves upwind of smoke generators during training.

- The concentration of fog oil that was determined to be safe when chronically inhaled by wildlife was lower than the occupational exposure standard determined protective for man. This is because their is a lack of fog oil toxicity information on wildlife compared to humans and this predicament creates uncertainty when attempting to assign concentrations that are protective of wildlife. To account for this uncertainty, the DOD guidance followed when conducting the ecological risk assessment required that toxicity values found in the literature be decreased to a more conservative number in order to add greater assurance of wildlife protection. Greater reductions were made for T & E species than for non-T & E species.

**5.2.2.15.B.1.1 RCP Alternative.** Anticipated fog oil training under the RCP Alternative would consume up to 125,500 gallons of fog oil annually in three different types of training which are: TG 7.2 Basic Generator Operation and Static Operation, TG 7.3 Mobile Operations, and TG 7.4 Field Training Exercises. A description of each can be found in Volume IV, Table IV.1, 7.0.

- **Direct Impact.** Fog oil obscurant training under the RCP Alternative is not anticipated to directly affect the health individuals involved in training and those individuals in on-post cantonment areas and outside the boundary of FLW (see detailed discussion on human health effects at 5.2.2.15.B.1). Those involved in training are expected to have the greatest potential for exposure to fog oil smoke; however, respiratory protection policies used by the Army will provide ample protection for those involved in obscurant training.

The preponderance of research evidence indicates that adverse health effects may only occur from repeated and prolonged exposures to fog oil concentrations greater than 5 $mg/m^3$. These exposures are not anticipated to those who train with fog oil, and those in the on-post cantonment areas and areas beyond the FLW boundary. Conservative (i.e., predicting worst-case) air dispersion modeling conducted to support the air quality impacts analysis indicates fog oil exposure concentrations greater than 0.15 $mg/m^3$ will not reach the on-post cantonment areas of FLW. The fog oil dispersion modeling also predicts that a fog oil concentration greater than 0.15 $mg/m^3$ will not cross the FLW boundary under the wind and meteorological conditions allowed under the operating permit.

- **Indirect Impacts.** Indirect impacts to human health from fog oil training under the RCP Alternative are not anticipated (see discussion at 5.2.2.15.B.1 for health effects). The deposition of fog oil onto soils, surface waters, and the surfaces of food that may be consumed by humans is so small that it cannot be detected by sensitive oil analyzers. The deposition amounts that are theoretically predicted by models are minute and well below concentrations that would pose a health risk should humans consume food exposed to fog oil smoke. Depositional amounts predicted by models are small enough that they are not anticipated to adversely affect water quality of surface waters at FLW or beyond the FLW boundary. The small amount of fog oil that could potentially deposit on soil is not anticipated to leach to groundwaters (potable or otherwise) because natural oil degradation rates exceed deposition rate, particularly considering the small depositional amounts anticipated.

**5.2.2.15.B.1.2 OPTM (Army's Proposed Action) Alternative.** The OPTM (Army's Proposed Action) Alternative is detailed in Volume IV, Tables IV.1, IV.2 and IV.3. In general it calls for less quantities of fog oil to be used in each of the three types of training (i.e., static, mobile, and field) than current training activities at Fort McClellan. The RCP calls for the use of 125,500 gallons (476,000 liters) of fog oil per year to conduct training. The OPTM (Army's Proposed Action) Alternative for fog oil obscurant training would reduce the annual consumption of fog oil to 84,500 gallons (321,1000 liters), yet retain the same quality of training. Direct and indirect human health impacts were determined to be insignificant for the RCP Alternative (see subsection 5.2.2.15.B.1.1) and will also be insignificant for the OPTM (Army's Proposed Action) Alternative.

**5.2.2.15.B.1.3 EPTM Alternative.** The EPTM would further reduce annual fog oil usage to 48,900 gallons (185,820 liters). Direct and indirect human health impacts were determined to be insignificant for the RCP Alternative (see subsection 5.2.2.15.B.1.1) and will also be insignificant for the EPTM Alternative.

### 5.2.2.15.B.2 Issue: *Training with Smoke Pots, Smoke Grenades, and Illumination Rounds.*

Smoke grenades include those that produce color smoke such as green, yellow, red, and violet using a pyrotechnic mixture of dextrin, oxidizer (potassium chlorate), and 1-methyl-amino-anthraquinone. Illuminating star clusters use phosphorus to produce both smoke and light as the material burns. Some smoke grenades use terephthalic acid (TPA) to produce smoke. Typically the colored grenades are used as field training props to represent or serve as a surrogates for real explosives or weapons. In combat or in training, they may also serve as markers to locate a friendly soldier's position for rescue or an enemy soldier's position for targeting. Smoke grenades and smoke pots may actually be used as an obscurant smoke screen.

White and red phosphorus star clusters consist of major modifications of elemental phosphorus. They are typically used as communication signals and for marking a location. White phosphorus is a highly reactive compound that reacts spontaneously with air when released from munitions. Consequently, white phosphorus is often combined with other materials that slow down smoke propagation. Red phosphorus is a less reactive form of elemental phosphorus and burns with butyl rubber to produce red smoke.

Smoke pots and to a lesser extent, terephthalic acid smoke grenades are used to produce obscurant smoke screens. During combat, they can be used to establish an initial screen until a larger fog oil generator can be deployed. They may be used in conjunction with fog oil obscurants or by themselves.

Smoke pots can be floated on water or used on land. Hexachloroethane has been historically burned in smoke pots at FMC for training events, but will be replaced by TPA at FLW. Terephthalic acid is less toxic to the environment and man, and degrades rapidly in the environment as compared to hexachloroethane.

The use of smoke grenades could occur at many locations at FLW because they have application in a number of different types of training activities. However, smoke grenades will not be used in conjunction with fog oil training. The Army intends to pursue, through a revised permit with MDNR, the use of smoke pots in association with fog oil training, although smoke pots may also be used at other locations and times also. From a human health evaluation perspective, exposure by inhaling smoke produced by phosphorus, teraphthalic acid and iron oxide/titanium zirconium is considered the most significant pathway as opposed to ingestion or dermal exposures.

With the transfer of the Military Police School, Chemical School and FMC Training Brigade to FLW, the total smoke grenade usage will increase by 8,480 to a new total of 12,808 grenades per year. Smoke grenades will be used at different training areas in a variety of training exercises at FLW. When the current usage at FLW is summed with the projected usage from the transfer of FMC training, for colored smoke grenades the usage will be 7,171 per year; and teraphthalic acid smoke grenades and smoke pots used per year will be 4,086. In addition to these grenades, the transfer of the Military Police School, Chemical School and FMC Training Brigade to FLW will increase the use of illumination star clusters from 4,490 clusters per year to 6,578 clusters per year.

Fort Leonard Wood's currently uses 110 smoke pots in training each year. The transfer of the FMC obscurant training to FLW will add 840 smoke pots and bring the total to 950. Less toxic teraphthalic acid will be burned in smoke pots for training students and cadre at FLW instead of the previously used hexachloroethane.
The additional annual use of 9,348 smoke grenades and 840 smoke pots will increase the inhalation exposure potential to trainees.

Adverse acute effects in humans have been reported when white phosphorus is burned at a concentration of 188 to 500 mg/m$^3$(Shinn, 1987). Symptoms include throat irritation, respiratory distress, coughing, nasal discharge, and headaches. Red and white phosphorous inhalation toxicity values for laboratory rats exposed for different durations and frequencies were converted by calculation to one-hour inhalation, LC50 values ( the concentration estimated to cause 50% mortality to the test animal during a one-hour exposure) by Shinn (1985). The LC50 values derived by Shinn were 4,000 mg/m$^3$ for red phosphorous and 2,500 mg/m$^3$ for white phosphorous. These elevated exposure concentrations are not anticipated for soldiers during training because illumination rounds (star clusters) are shot into the air, and soldiers will not be close to the smoke produced by the burning star cluster. Also, star clusters burn quickly (measured in seconds) and the amount of smoke produced is limited.

Only rarely would a soldier be close enough to a burning smoke grenade for long durations to receive exposures that would compromise health. Smoke production from grenades lasts up to two minutes; however, soldiers typically maintain a distance upwind from the smoke source and would receive minimal exposure during this period. Dispersion of smoke occurs rapidly and by the time smoke leaves the boundary of training areas, exposure concentrations will be far below those levels known to affect humans.

At FLW, TPA will be substituted for hexachloroethane in smoke grenades and smoke pots. Terephthalic acid has negligible environmental toxicity and is rapidly degraded in the environment (USEPA, 1996). NIOSH provides an oral LD50 in rats for TPA of 18,800 mg/kg (USEPA, 1982). Terephthalic acid induces bladder and uretal neoplasms in rats of both sexes when administered at 5 percent (1000 mg/kg/day) of the diet and induces a high incidence of bladder stones. No tumors or other toxic effects were found. Studies with rats and rabbits found no teratogenic effects (USEPA, 1996). No adverse inhalation effects were observed in rats dosed with pyrotechnically disseminated TPA (Thompson, 1988; and Muse, 1995). Because personnel typically stand upwind of smoke pots during training exercises and TPA exhibits limited toxicity, no adverse health effects are anticipated to trainees. Rapid dispersion of smoke from pots

indicates individuals in the cantonment areas and in areas off-base will not experience unhealthy exposures.

Implementation of any of these action alternatives (RCP, OPTM [Army's Proposed Action] and EPTM) will have similar impacts.

- **Direct Impact.** No direct impacts are anticipated from the use of smoke pots and smoke grenades. The limited duration and frequency of exposure in combination with the low toxicity of the different types of smokes used in training indicate there will be negligible risk associated with the use of smoke grenades and smoke pots at FLW.

**5.2.2.15.B.3 Issue: *Training with Biological Materials That Simulate Biological Agents.*** A detailed description of this training can be found in Volume IV, Tables IV.1, IV.2 and IV.3 at item 2.0 - "Biological Integrated Detection System (BIDS) Battlefield Employment and Operation." The training involves instruction on the use of equipment, instruments and analyzers contained in a mobile field laboratory called a BIDS. Students use the laboratory equipment to identify the potential presence of biological agents on the battlefield, thereby providing early warning so that proper defensive measures may be employed.

Harmless simulants are used in BIDS training instead of the actual biological agents. Simulants used include the naturally occurring bacterium, *Bacillus subtilus* var. *niger*; kaolin dust (a common type of clay found in earth); male specific coliphage bacterium (MS2); the bacterium *Erwinia herbicola*; and ovalbumin (a common glycoprotein). The bacteria to be used as biological simulants are not disease causing or pathogenic to man and are used in small quantities. Kaolin is a non-toxic natural clay material found in earth, and ovalbumin is a common glycoprotein found in mammals and is not toxic. A discussion of the health and safety aspects associated with the biological agent simulants is found in Volume III, Appendix B subsection B.2.12.1.

Implementation of any of these action alternatives (RCP, OPTM [Army's Proposed Action] and EPTM) will have similar impacts.

- **Direct Impacts.** The substances used to simulate biological agents in this training have insignificant toxicity to humans and are also used in very limited amounts. Therefore, the health of those involved in training, and those individuals in the cantonment area of the facility and at off-base locations will not be affected.

**5.2.2.15.B.4 Issue: *Training with Chemical Agent Simulants.*** Training with chemical agent simulants is described in Volume IV, Tables IV.1, IV.2, and IV.3. Part 3.1 - Fox Battlefield Employment and Operation. The training includes instruction to operate a mobile chemical laboratory called the FOX vehicle and all chemical analytical equipment contained in the lab. Chemicals which have very limited toxicity to humans are used as surrogates for actual warfare chemicals in this training. Students learn how to operate analyzers using the non-toxic surrogate chemicals. Properly trained personnel must have the ability to detect actual warfare chemical agents in the field. In combat, this information is lifesaving so that troops can either avoid a contaminated area or don appropriate protection before entering a contaminated zone.

Training on the use of the mobile lab (FOX) and analyzers is conducted in the classroom; in a FOX simulator located inside a classroom; and in the field with the FOX. Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW.

- **Direct Impacts.** A description of the chemicals used to simulate warfare chemicals and the quantities used can be found in Volume IV, Table IV.2, Part 3.1 and Volume III, Appendix B subsection B.2.12.4 under FOX Simulants. The chemicals used as surrogates are, diethyl phthalate, benzaldehyde, cyclohexanone, eucalyptol, methyl salicylate, diethyl malonate, dimethyl phthalate, ammonia, acetone, ethyl phthalate, isopropyl, and anisole. The chemical surrogate

amounts used in training are projected to pose little significant toxicity to humans, particularly when considering the small quantities and limited exposure potential during this training. The limited quantities of these surrogate chemicals present negligible exposures and health risks. No health risks are anticipated from training with chemical agent simulants.

**5.2.2.15.B.5 Issue: *Training with Toxic Agents at the CDTF.*** A detailed description of this training is found in Volume IV, Table IV.1, Training Goal 6.3. The training generally entails the proper use of personal protective gear to mitigate exposure to chemical warfare agents; understanding how to use analyzers to detect chemical agents; and practicing methods for decontaminating personnel and equipment. All training is conducted in a specially designed facility called the CDTF. A number of control features are designed into the CDTF to effectively contain chemical agents inside the facility during normal training. Subsection 5.2.2.3.6 explains air monitoring and filtration systems in place at the CDTF that serve to mitigate unhealthy exposures to the chemicals used in training.

As part of the safety precautions associated with the CDTF, a 985-foot (300-meter) restricted access security buffer area will be established beyond the fence line surrounding the facility. The buffer area will serve as a no access zone in the event of a release and only operational activities directly associated with the CDTF will be permitted within the zone at that time. Human toxicity information on GB and VX can be found at subsection B.2.12.3 in Volume III of the FEIS. The Airborne Exposure Limit -Time Weighted Average for a 40 hour work week has been established by the Department of Defense (DOD) at 0.0001 $mg/m^3$ for GB and 0.00001 $mg/m^3$ for VX (DA, 1996 and 1993).

The binary components of GB are: 1) methylphosphonic diflouoride (DF); and 2) isopropyl alcohol/ isopropylamine. The suggested permissible airborne exposure concentration for DF for an 8-hour workday or a 40 hour week is an 8-hour time weighted average (TWA) of 0.008 $mg/m^3$ as established by DOD (DA, 1989). The TLV-TWA for isopropropyl alcohol is 983 $mg/m^3$ (ACGIH, 1995).

The binary components of VX are: 1) QL which has the chemical name o-(2-diisopropylaminoethyl) o'-ethyl methylphosphonite ethyl (2-diisopropylaminoethyl) methylphosphonite (EDMP); and 2) NE which is powdered sulfur with a small amount of silica aerogel. The suggested permissible airborne exposure concentration for QL for an 8-hour workday or a 40 hour week is an 8-hour TWA of 0.03 $mg/m^3$ (DA, 1991c).

Minute quantities of toxic chemical agents GB and VX are used in a controlled environment as part of the training. Students must demonstrate proficiency by putting on personal protective equipment, and correctly locating, identifying and decontaminating equipment props as part of a decontamination team. Students must also decontaminate themselves and members of their team. Water containing DS2 decontaminating solution and sodium hypochlorite are used to decontaminate surfaces containing the agent.

All alternatives considered require building a CDTF at FLW. The chemical agents VX and GB will be used in this training as described in Volume IV, Tables IV.1 and IV. 2, Training Goal 6.3. A discussion of the toxicity of VX and GB, and the quantities used in training at the CDTF is in Volume III, Appendix B subsection B.2.12.5.3.1.3. VX and GB are both extremely potent nerve agents that are activated by combining two chemicals. Because of the need to combine with another chemical for activation, the VX and GB chemicals are called binary agents. The VX and GB agents to be used in yearly training are mixed 2-3 and 1-2 times per year, respectively. The total mixture of each agent is stored in a double locked vault under heavy security requirements at the CDTF until removed for individual training events.

In training, small quantities of VX and GB are used under a very strict set of safety procedures contained in Department of the Army Pamphlet 385-61, "Toxic Chemical Agent Safety Standards " (DA, 1992). The engineering control designs built into the CDTF and the procedures followed in training allow for the deliberate and controlled release of minute amounts of toxic chemical agents (TCAs) in a manner that reduces risks to the minimum. Engineering controls include ventilation/filtration systems to guard against the release of TCAs to the ambient air outside the CDTF and state-of-art monitors to detect threatening levels of agents in the air within the CDTF.

The maximum amount of toxic agent used during each training cycles includes:

- Approximately 0.006 ounce (0.2 ml) of GB in each training bay with a maximum of 0.048 ounce (1.6 ml) of GB used during a training cycle; and

- Approximately 0.03 ounce (1.0 ml) of VX in each training bay resulting in a maximum of 0.24 ounce (8.0 ml) of VX being used in each training cycle.

Instructors apply portions of this amount to various pieces of equipment (e.g., a jeep used as a prop) contained in different rooms set up to represent several decontamination scenarios. The amount of GB or VX released in the training areas have been calculated to allow a soldier ***not wearing respiratory protection*** to remain in the training area for approximately 29 minutes without long-term health impacts.

The operating procedures and control designs within the CDTF at FMC have been successfully applied to train over 38,000 students without any mishaps related to toxic agents. In training at the CDTF, students are taught methods for detection of agents, protection from agents, decontamination, and cleanup of any toxicological agent spill. Once small quantities of a chemical agent (either GB or VX) are applied to equipment props in training areas, students use their previously learned and rehearsed skills to detect and decontaminate the agent under supervision of Chemical School instructors who are also trained in emergency response.

Emergency preparedness is trained and drilled at the CDTF at FMC in adherence to strict Army safety and emergency preparedness/response policy. The same detection, decontamination and personal protection procedures taught to students for GB and VX would be used to detect and neutralize (detoxify) any agents that might be released to the environment. As previously stated, the quantities of the two agents used for classes (in controlled/contained rooms) at the CDTF are very small and the likelihood of health threatening amounts escaping containment of the CDTF is remote. In the 10 years of operation of the CDTF training at FMC, there has never been an incident that threatened the health of any individual either inside or outside the facility. Design and construction of the facility at FLW will be based on the existing facility, with modification to make the system more effective and efficient at containing the toxic agents.

Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts at FLW.

- **Direct Impact.** A facility designed similar to the CDTF at FMC would be constructed at FLW, but with improved engineering controls and monitoring systems. CDTF training is not anticipated to cause adverse health effects to individuals in training or to those outside the facility for the following reasons:

    - Rigid toxic agent handling and protection procedures established by the Department of the Army are adhered to at all times.
    - Only small amounts of toxic agents are used at one time in training.
    - The CDTF has sophisticated, built-in engineering controls to prevent the escape of toxic agents from the facility.
    - High-level security is maintained at all times to prevent toxic agents from being taken from the facility.

### 5.2.2.15.B.6 Issue: *Disposal of By-Products of Toxic Agent Training at the CDTF.*

The current practice for treatment and disposal of toxic chemicals and solid wastes generated at the CDTF is thoroughly discussed in the "Standard Operating Procedures (SOPs)" for the CDTF at FMC (DA, 1994b). In general, four primary types of waste are generated at the CDTF at FMC. They include, 1) non-hazardous decontamination washwater, 2) non-hazardous solid materials which have been exposed to toxic chemicals, 3) medical waste, and 4) a small quantity of hazardous waste. Only a small quantity of hazardous waste is generated yearly at the CDTF and includes mask filters (used by allied students) containing chromium, mercuric cyanide used in M256A1 detector kits and mercury and silver fluoride from

laboratory equipment. Hazardous waste and medical waste generated at the CDTF are disposed/treated in accordance with applicable RCRA requirements.

Wastewater resulting from the decontamination of equipment props in controlled atmosphere training rooms flows to a center trench (in each training room), then to a common sump located in Bay 7 in the CDTF. Water is pumped through a closed pipe system to a 20,000 gallon storage tank which is located in a concrete and bermed secondary containment area outside the CDTF building, but still inside the fenced area of the CDTF. The wastewater is stirred by an agitator inside the tank prior to sampling to determine if residuals of GB and VX remain. The sample is analyzed by a GC method which provides a detection limit of 20 parts per billion (ppb). If concentrations are found to be above 20 ppb the wastewater is further treated with DS2 solution. The wastewater will again be tested to assure VX and GB are below 20 ppb. The significance of 20 ppb is drinking water containing nerve agents at this concentration can be consumed by troops in combat areas for up to 7 consecutive days; however, there is a potential for health impacts at this concentration (DA, 1986b).

The decontamination washwater that is collected after each training session is tested to determine whether residuals of the toxic agents remain and further treated if they are found to remain. The water is again analyzed for residual agents and if no presence is detected above established standards, the water is pH adjusted before disposal or thermal treatment is applied. The decontaminated and pH adjusted wastewater is not considered a RCRA hazardous waste as determined by appropriate chemical testing. At FMC, wastewater is thermally treated at the CDTF, whereas other waste water handling alternatives have been identified in the Draft EIS for FLW. A chemical analysis of wastewater from the CDTF at FMC (FMC, 1997) is provided in Table 5.16 (on page 5-77).

Solid materials with impervious surfaces, such as respiratory protectors, rubber boots, other rubber gear, etc., are surface decontaminated with an agent neutralizing solutions. At FMC, the materials are sent to the thermal treatment unit at the CDTF for thermal destruction. Likewise, inner-garment (cloth) materials that are scheduled for replacement are taken to the thermal treatment unit at the FMC CDTF facility for thermal destruction. Other treatment/disposal alternatives for FLW have been identified in the EIS, Appendix I for handling the surface decontaminated solids described above as well as the inner-garment (cloth) materials scheduled for replacement.

The medical monitoring program at the CDTF results in the generation of medical wastes, consisting primarily of syringes, gauze, and test tubes. Medical wastes will be disposed/treated according to appropriate Federal, state and local requirements.

#### 5.2.2.15.B.6.1 RCP Alternative

- **Direct Impact.** Current RCP Alternative practices would not be anticipated to directly threaten human health. Under the RCP Alternative, liquid and solid wastes are first treated to neutralize any residual agent remaining in the liquid or on the surfaces of impervious solids, then subjected to thermal treatment for destruction at the CDTF. A permit to construct has been issued by Missouri Department of Natural Resources for the thermal treatment unit planned for construction at the FLW CDTF. The permit requires a pre-startup performance test of emissions from the thermal treatment unit. The permit specifies analyses for 10 heavy metals, hydrogen fluoride, hydrogen chloride, carbon monoxide and chlorine gases, 10 chlorinated carbon compounds (includes dioxins and furans), the chemical agents, VX and GB, and particulate matter. The thermal treatment unit is considered to have passed the test if the limits specified in the construction permit are not exceeded. The limited quantity of decontaminated hazardous waste generated at the CDTF is handled in accordance with RCRA regulations and disposed/treated off-post at a licensed hazardous waste facility.

- **Indirect Impact.** These methods of waste treatment are not expected to result in any indirect health threatening exposures (at on-post and off-post locations) to chemical agents or toxic chemicals in the thermal unit's emissions.

**5.2.2.15.B.6.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM Alternatives would decontaminate solid and liquid waste as described for the RCP Alternative in subsection 5.2.2.15.B.6.1, but instead of thermal treatment at the CDTF, the decontaminated waste by-products would be shipped off-site for treatment/disposal at a commercial treatment facility. Although the material is classed as a non-hazardous waste, the Army has elected to store and ship the wastes in accordance with the more stringent State of Missouri and USEPA hazardous waste requirements. Federal, state and local regulations governing the transportation of hazardous waste specify proper shipping containers, labeling and placarding requirements, manifesting, and emergency actions to be taken should transported waste be accidentally be spilled. Rigid compliance with these regulations will be observed.

Results of the CDTF wastewater analysis (located on Table 5.16 in subsection 5.2.2.8.5) along with other input data were used to estimate the risk of shipping wastewater from FLW to a commercial disposal or treatment facility by use of the Chemical Accident Statistical Risk Assessment Statistical Model (CASRAM)(FMC, 1997). The CASRAM is a statistical model which predicts the probability of transportation accidents, the probability of a release given an accident and the probability of humans being affected given accidental releases. To predict risks, the model uses type of transportation (e.g., rail, truck, etc.); amount of material shipped and frequency; toxicity of the material; and concentration of the toxic ingredients.

The model contains an extensive meteorological database to statistically model chemical release rates and material dispersion through Monte Carlo sampling of accident scenarios. This information is combined with health criteria for the applicable chemicals to predict exposures from spills to populations along the route traveled.

The probability that one or more persons will be exposed to a concentration exceeding the emergency response criteria, during any given year of operation, is $6.88 \times 10^{-5}$. This probability indicates that one person has a chance of being affected in 348,000 shipments. At this rate one can expect one person to be affected in 14,500 years of shipping.

Similarly, the probability that 100 or more persons will be exposed to concentrations exceeding criteria, during one spill event is $3.33 \times 10^{-9}$. This probability indicates that 100 people have a chance of being affected by one spill event in 7,200,000,000 shipments. At this rate one can expect 100 people to be affected by a release event in 300 million years of shipping.

The statistical probabilities predicted by the CASRAM model show the chance that a person or group of people will be affected by a transportation related spill of the CDTF wastewater is very remote.

The medical waste generated in association with personnel monitoring will be treated/disposed off-post at a licensed commercial facility as part of the routine process used to handle medical waste currently generated at FLW. The limited amount of hazardous waste generated at the CDTF will be handled as described in the RCP Alternative.

- **Direct and Indirect Impact.** There are no anticipated direct or indirect impacts to human health associated with these alternatives.

**5.2.2.15.B.7 Issue: *Training with Radiological Isotopes.*** A description of training with radiological isotopes is at Volume IV, Tables IV.1 and IV.2, Training Goal 8.1 (Radiation Safety). The objective of radiation training is to ensure students understand and are able to apply the principles and practices of radiation protection, monitoring, radiation health effects, calculation of exposures, decontamination procedures, handling, transportation , storage, and disposal of low-level radioactive waste.

**5.2.2.15.B.7.1 RCP Alternative.** Student training is conducted in three possible types of settings. One is a normal classroom used for lecture. The second setting is a controlled laboratory area where students learn to operate detectors and other instruments, as well as many other principles of radiation safety using

sealed and unsealed radiological materials. Although it has never been done, the third setting is in the field where students must locate, identify, contain and decontaminate unsealed radiological sources that have been strategically placed in the field by instructors who are radiation safety experts.

A sealed source can be generally defined as radioactive material that is encapsulated in a plastic or resin material. Sealed radiological material is impervious to water and is not dispersed by wind.

- **Direct Impact.** Laboratory training is not anticipated to cause adverse health effects to individuals involved in training or to those outside the laboratory area for the following reasons.

  - Rigid radiation handling/protection procedures established by the NRC and the Army are adhered to at all times.
  - Highly potent radiation sources are not used in training.
  - Only small amounts of radioactive material are used in training.
  - Sealed sources are primarily used.
  - The laboratory has built-in engineering controls to prevent the escape of radiation sources from the laboratory.
  - Security is maintained at all times to prevent radiological sources from being taken from the laboratory.

  Adverse health effects are not anticipated from training with radiological materials in the field for the reasons listed for training in the laboratory with the exception that engineering controls found in the laboratory setting cannot be duplicated in the field. Direct impacts to human health are not anticipated during laboratory or field training given the limited amount of low activity radioactive materials used and the strict controls and handling procedures applied during training events.

**5.2.2.15.B.7.2 OPTM (Army's Proposed Action) and EPTM Alternatives.** The OPTM (Army's Proposed Action) and EPTM Alternatives remove the potential use of unsealed sources for field training. This option affords even greater assurance to human health protection than the RCP Alternative. No direct or indirect human health effects are anticipated with this alternative.

**5.2.2.15.B.8 Issue: *Release of Unburned Fuels from FFE Deterrents Training.*** A description of this training is in Volume IV, Tables IV.1, IV.2 and IV.3. TG 1.3 "Expedient Mines and Obstacles Designed to Prevent Movement" training activity includes: 1) the use, placement, location, neutralization, camouflage, explosion, and demolition of both field expedient and pre-manufactured (issue) mines; and 2) the use, placement, location, neutralization, and camouflage of other obstacles designed to hinder enemy movement.

Of the different types of this training, FFE deterrents training poses the greatest potential risk to the environment from the large volumes of gasoline used as explosives for field detonation.

**5.2.2.15.B.8.1 RCP Alternative**

- **Direct Impacts.** A limited amount of Mines and Obstacles Designed to Prevent Movement training is currently conducted at FLW. This existing training involves demonstrating the manufacture and use of FFE deterrents. Thickened and unthickened gasoline is exploded in the course of the training. An investigation of the potential for hydrocarbon constituents in exploded gasoline (used in FFE deterrents training) to contaminate soil was conducted (FLW, 1996b). The findings demonstrated that surface soils were contaminated with hydrocarbons, including benzene, toluene, xylene and ethylbenzene as a result of one FFE weapon explosion. The implications of surface soil contamination are that hydrocarbon contaminants in soils have the potential to leach to groundwater and/or be carried with runoff to surface waters such as creeks, ponds, rivers, etc.

  The study (FLW, 1996c) indicated the potential for contamination of surface soils with hydrocarbons from exploded gasoline in FFE deterrents training. The study was based on a one-

investigations. Students are also trained in battlefield circulation control, area security, prisoners of war and civilian prisoner handling, and police intelligence.

The Chemical School has the mission to provide education and training of selected U.S. military, foreign military, and civilian personnel. Chemical School students are instructed in the detection and identification of NBC agents; protection against NBC agents; and cleanup of NBC agents. This training gives personnel the ability to survive and respond to nuclear, biological and chemical attacks or incidents. Students are also trained in employment of smoke and other obscurant systems; and FFE deterrents operations designed to impede aggressor forces and protect friendly forces.

Both the Military Police School and Chemical School develop technically and tactically competent soldiers. Instruction and training are given in the full range of warfighting situations and Operations Other-than-War that personnel may be required to respond to. Typical Operations Other-than-War include life and safety assignments such as disaster relief, civil disturbances and peacekeeping. The range of this training has been developed to prevent and reduce loss of life in both the military and civilian populations.

Volume IV, Table IV.1, of the EIS documents the initial review of over 205 training method alternatives that were reviewed as part of the initial screening effort in this EIS. The initial viability screening of these training methods eliminated from further review training methods that were unsafe, or failed to provide the required level of training. Methods that survived this initial screening review are therefore able to meet minimum training requirements.

The ability of the Military Police School and the Chemical School to provide required training in an efficient manner was also reviewed in Volume IV of the EIS. Table IV.3 documents this review of alternative training methods that could be used for meeting the training requirements of the two schools scheduled for relocation. As discussed on subsection IV.7.3, a team of evaluators used six environmental and six operational criteria to select the OPTM (Army's Proposed Action) Alternative and the EPTM Alternative. The EPTM Alternative for each of the 43 training goals represents that training method that received the highest relative score for the six environmental criteria. The OPTM (Army's Proposed Action) Alternative represents the alternative training method that received the highest relative score in all twelve criteria, with the exception of TG 7.2 and TG 7.4. See subsection 3.3.2.2. for additional clarification of this issue.

**5.2.2.17.1.1 RCP Alternative.**

- **Direct Impacts.** Continuation of the RCP Alternative would result in higher environmental impacts or reduced training efficiency when compared to the implementation of newly identified alternative training methods included as part of the OPTM (Army's Proposed Action) Alternative as discussed in subsection 5.2.2.17.1.2 (below). Training goals for which continuation of the RCP Alternative would result in higher levels of environmental impacts or reduced training efficiency include: TG 1.3 Mines and Obstacles; TG 2.2 BIDS Maintenance; TG 3.2 FOX Maintenance; TG 4.6 Computer Operations; TG 6.1 NBC Procedures; TG 6.3 NBC Decon Advanced (Toxic Agent); TG 6.4 NBC Survival Recovery; TG 7.2 Obscurant, Employment Operations Basic (Static); TG 7.3 Obscurant, Employment Operations (Mobile); TG 7.4 Obscurant. Employment Operations (Field Training Exercises; TG 7.5 Obscurant, Generator Maintenance; TG 6.3 NBC Decon Advanced (Toxic Agent); TG 7.6 Obscurant, Storage Operations; TG 8.1 Radiation Safety; TG 9.1 Research Support; TG 9.2 Specialized/Classified and Museum Support; TG 11.1 Vehicle Operations, Driver Qualification; and TG 11.3 Vehicle Maintenance. Implementation of the RCP Alternative would also include the construction of dedicated classrooms to be used in instruction many of the training objectives, thereby increasing initial construction costs, long-term maintenance and operations costs, and the amount of clearing required for construction of the support facilities.

  Implementation of the RCP Alternative (when compared against the OPTM (Army's Proposed Action) Alternative) would improve the quality of the training provided to students in only three of the forty-three training goals: TG 7.3 Obscurant, Employment Operations (Mobile); TG 7.4

time directional explosion of 55 gallons (209 liters) of thickened gasoline contained in a metal drum. It is reasonable to expect that frequent use of an area for FFE deterrents training may result in continued contamination of surface soils. It is unknown whether natural degradation rate of hydrocarbons in the soils will maintain pace with the rate of addition of hydrocarbons from FFE deterrents training. Potential contamination of soils and ground water at the FFE training area will not cause a direct human health effect.

- **Indirect Impacts**. There is a potential that hydrocarbon contaminants could leach to groundwater or find there way to surface waters with stormwater runoff. Field monitoring would have to be conducted overtime to determine the potential for this to occur. The risks posed to individuals would depend on their source of drinking water. The use of ground water for drinking water is approximately 8,000 feet (2,400 meters) from the range planned for FFE deterrents training. Even if groundwater was contaminated, it is not feasible to expect contaminated groundwater to migrate to areas where it is used for drinking water. If monitoring after training is initiated, indicates contamination of groundwater and/or surface water, but the water is not used for drinking water by man, an indirect health risk will not exist.

#### 5.2.2.15.B.8.2 OPTM (Army's Proposed Action) and EPTM Alternatives

- **Direct Impact.** The OPTM (Army's Proposed Action) and EPTM Alternatives call for the use of less gasoline and thickener in FFE deterrents training and would configure the field training area to minimize the potential for groundwater and surface water contamination. Controls at the FLW field site where FFE deterrent training is to be conducted will consist of subsurface linings placed under the areas where the wall of flame training will be conducted, and construction of earthen berms and a surface-water catchment basin for control of stormwater runoff. Whereas soil and groundwater contamination is still possible with these controls, direct impacts to human health are not anticipated.

- **Indirect Impact**. As discussed above indirect impacts of FFE training area not anticipated.

## 5.2.2.16 Installation Agreements

Implementation of the planned BRAC training objectives at FLW will result in the following issue with respect to Installation Agreements:

- Development of new agreements to accommodate relocated units.

Since this issue is associated with the relocation of personnel, it is discussed in subsection 5.4.2.16.

## 5.2.2.17 Operational Efficiency

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Operational Efficiency:

- the ability of the Army to accomplish its mission requirements through operationally efficient training methods; and
- the increased synergistic effects of training Chemical, Engineer, and Military Police specialists in one location.

### 5.2.2.17.1 Issue: *Accomplish Mission Requirements Through Operationally Efficient Training Methods.*

The U.S. Army Military Police School has the mission to provide education and training of selected U.S. military, foreign military, and civilian personnel. Military Police School students are instructed in traditional police functions such as traffic control and crime investigation, fraud investigation, combating terrorism, hostage negotiation, protective services, and counter narcotics

Obscurant, Employment Operations (Field Training Exercises); and TG 7.5 Obscurant Generator Maintenance.

- For TG 7.3 and TG 7.4 students would be allowed to use more fog oil in their training, and therefore train for longer periods of time when compared against the OPTM (Army's Proposed Action) Alternative or the EPTM. Consequently the improved training efficiency would result increased environmental impacts (when compared against either the OPTM (Army's Proposed Action) or the EPTM) associated with additional fog oil usage.

- For TG 7.5 Obscurant Generator Maintenance the RCP Alternative received a higher rating when compared against the OPTM (Army's Proposed Action) Alternative or the EPTM Alternative, because it would allow maintenance to occur at any location on the installation, providing a higher level of "battlefield realism" during field training.

On the other hand, implementation of the RCP Alternative (when compared to the OPTM (Army's Proposed Action) Alternative) would fail to capture numerous improvements in training methods that were identified as part of the alternatives analysis. Consequently the RCP Alternative received lower training realism, effectiveness score in six of the forty-three training goals, including: TG 1.3 Mines and Obstacles; TG 4.6 Computer Operations; TG 7.6 Obscurant, Storage Operations; TG 9.1 Research Support; TG 9.2 Specialized/Classified and Museum Support; and TG 11.1 Vehicle Operations, Driver Qualification.

- **Indirect Impacts.** Implementation of the RCP Alternative would include the construction of dedicated classrooms to be used in the instruction of many of the training objectives, thereby almost doubling the initial construction requirements, associated costs and associated environmental impacts; long-term maintenance and operations costs; and the amount of clearing required for construction of the support facilities when compared to the OPTM (Army's Proposed Action) Alternative.

**5.2.2.17.1.2 OPTM (Army's Proposed Action) Alternative.** As illustrated in Volume IV, Table IV.3, implementation of the OPTM (Army's Proposed Action) would result in each of the training methods being accomplished in the manner determined to be the most efficient method based on the combined score of the six environmental and six operational efficiency criteria used in the secondary screening, with the exception of TG 7.2 and TG 7.4. As discussed in subsection 3.3.2.2 the alternative that received the highest total score for these TGs was not selected for the OPTM because:

- the training method for TG 7.2 would require the use of newly fielded manifolds for which long-term reliability and maintenance information is not available; and
- the training method for TG 7.4 would require the use of a computer simulation system that is not currently available or planned.

Each of the methods that received the highest score for these two training goals was included in the EPTM Alternative discussed in 5.2.2.17.1.3 (below). See subsection 3.3.2.2 for additional clarification of this issue. Because these methods were ranked the most desired in the screening process documented in Volume IV, they have been designated as the Army's Proposed Action.

- **Direct Impacts.** As illustrated in Volume IV, Table IV.3, approximately 17 training methods were identified for which the Alternatives review process identified a training method to accomplish the training goal that was preferred over the current practice. These new training methods were selected as the OPTM based upon their total score for the environmental and operational criteria considered. Consequently, implementation of the OPTM (Army's Proposed Action) Alternative would result in lower environmental impacts or increased training efficiency when compared to the RCP Alternative. These training goals included: TG 1.3 Mines and Obstacles; TG 2.2 BIDS Maintenance; TG 3.2 FOX Maintenance; TG 4.6 Computer Operations; TG 6.1 NBC Procedures; TG 6.3 NBC Decon Advanced (Toxic Agent); TG 6.4 NBC Survival Recovery; TG 7.2 Obscurant, Employment Operations Basic (Static); TG 7.3 Obscurant, Employment

Operations (Mobile); TG 7.4 Obscurant. Employment Operations (Field Training Exercises; TG 7.5 Obscurant, Generator Maintenance; TG 7.6 Obscurant, Storage Operations; TG 8.1 Radiation Safety; TG 9.1 Research Support; TG 9.2 Specialized/Classified and Museum Support; TG 11.1 Vehicle Operations, Driver Qualification; and TG 11.3 Vehicle Maintenance.

Implementation of the OPTM (Army's Proposed Action) Alternative (when compared to the EPTM Alternative) will result in higher levels of training effectiveness in six training goals, including: TG 4.3 GMT, NBC Personal Protective Equipment; TG 4.4 Signals & Other Non-verbal Communications; TG 4.5 Radio Communications, including secure communications; TG 7.4 Obscurant. Employment Operations (Field Training Exercises; TG 10.1 Weapons Training; and TG 11.2 Evasive Driving. These higher training effectiveness ratings are related to (1) the availability of specialized classroom facilities to support training, (2) an increase in the amount of time allowed for training, and/or (3) an increase in the level of realism offered by the training.

1) **Specialized Classroom Facilities.** Implementation of the OPTM (Army's Proposed Action) will provide approximately 15 additional classrooms with a total of approximately 22,500 square feet that will not be provided under the EPTM Alternative. These additional classrooms will include the following.

   (a) Specifically designed communications training labs (applied instruction areas) designed to augment field training for TG 4.4 Signals & Other Non-verbal Communications and TG 4.5 Radio Communications, including secure communications. These labs would allow for students to practice communications skills regardless of weather conditions in an environment that could be controlled by the instructor in order to stress specific training objectives. Without these facilities instruction would be conducted in exterior training areas and would be adversely impacted by inclement weather, additional transportation and logistics requirements, and increased radio maintenance requirements (including more frequent battery change requirements).
   (b) Training area classrooms would not be provided at the non-cantonment training areas used for TG 4.3 GMT NBC Personnel Protective Equipment; TG 4.4 Signals & Other Non-verbal Communications; and TG 11.2 Evasive Driving. Without these additional classrooms, instruction would be conducted in exterior training areas and would be adversely impacted by inclement weather.

   Consequently, implementation of the EPTM would result in the degradation of training associated with these TGs as specifically designed laboratories that would allow for the control of the training environment would not be constructed.

2) **Amount of Time Allowed.** The deployment of obscurant is one of the key military occupational skill areas for Chemical specialists. Chemical specialists must be proficient in the four primary battlefield applications of smoke: (1) obscuration, (2) screening, (3) protecting, and (4) marking. If effectively used obscurant will defeat enemy reconnaissance, surveillance and target acquisition and weapons guidance systems, thereby providing protection to United States and allied forces. Training under realistic military operational environments is critical to ensuring a thorough understanding of the effects of meteorological conditions, and to train the selection of the proper obscurant and dispersion methods. Training effectiveness in TG 7.4 Obscurant. Employment Operations (Field Training Exercises would be improved thorough the additional amount of time that would be allowed for field training under the OPTM (Army's Proposed Action) Alternative versus the EPTM Alternative. Using up to 56,000 gallons per year of fog oil in field training (versus up to 28,500 gallons per year specified in the EPTM Alternative) would almost double the amount of time that individual students would be allowed to operate generators. The longer training period allowed under this training method will also allow:

   - students to exercise logistical resupply requirements involving the delivery of fog oil to units in the field and the refilling of generators that have been in use; and

- adjust smoke thorough operation of the generator system to react to changing meteorological conditions as would be required on the battlefield.

Consequently, the OPTM (Army's Proposed Action) Alternative provides a noticeable increase in training efficiency in this training goal, and as illustrated on Table IV.3 provides the best balance of training requirements and environmental considerations.

3) **Level of Realism Offered by the Training.** Training with high explosive Mark 19 rounds will provide more realistic training than training with only modified training rounds. Consequently use of both high-explosive and modified training rounds, as specified in the OPTM (Army's Proposed Action) Alternative, will provide more realistic training than training with only modified training rounds as specified in the EPTM Alternative. Consequently training for TG 10.1 Weapons Training will be more effective under the OPTM (Army's Proposed Action) than under the EPTM Alternative. Likewise as discussed in item 2 above, the increased amount of training time this alternative provides for obscurant training will allow for students to practice under varied meteorological conditions, thus increasing the level of realism.

- **Indirect Impacts.** Implementation of the OPTM (Army's Proposed Action) would reduce the amount of initial construction to approximately one-half of the amount that would be required if the RCP Alternative were implemented. This reduced level of construction would reduce the cost of the initial construction effort, and the long-term costs associated with the maintenance, operation and repair of the facilities.

  When compared to the EPTM this alternative would result in the construction of approximately 15 additional classrooms with a total of approximately 22,500 square feet; thereby resulting in a slight increase in initial construction costs; long-term costs associated with the maintenance, operation and repair of the facilities.

**5.2.2.17.1.3 EPTM Alternative.**

- **Direct Impacts.** As illustrated in Volume IV, Table IV.3, approximately 23 training methods were identified for which the Alternatives review process identified a training method to accomplish the training goal that would result in reduced environmental impacts when compared to the RCP Alternative. These training goals include: TG 1.3 Mines and Obstacles; TG 2.2 BIDS Maintenance; TG 3.2 FOX Maintenance; TG 4.3 GMT, NBC Personal Protective Equipment; TG 4.4 Signals & Other Non-verbal Communications; TG 4.5 Radio Communications, including secure communications; TG 4.6 Computer Operations; TG 6.1 NBC Procedures; TG 6.3 NBC Decon Advanced (Toxic Agent); TG 6.4 NBC Survival Recovery; TG 7.2 Obscurant, Employment Operations Basic (Static); TG 7.3 Obscurant, Employment Operations (Mobile); TG 7.4 Obscurant. Employment Operations (Field Training Exercises; TG 7.5 Obscurant, Generator Maintenance; TG 7.6 Obscurant, Storage Operations; TG 8.1 Radiation Safety; TG 9.1 Research Support; TG 9.2 Specialized/Classified and Museum Support; TG 10.1 Weapons Training; TG 11.1 Vehicle Operations, Driver Qualification; TG 11.2 Evasive Driving; and TG 11.3 Vehicle Maintenance.

  Implementation of the EPTM Alternative will result in the same level of training efficiency (when compared to the OPTM (Army's Proposed Action) Alternative in 14 of the training goals, including: TG 1.3 Mines and Obstacles; TG 2.2 BIDS Maintenance; TG 3.2 FOX Maintenance; TG 4.6 Computer Operations; TG 6.1 NBC Procedures; TG 6.3 NBC Decon Advanced (Toxic Agent); TG 6.4 NBC Survival Recovery; TG 7.3 Obscurant, Employment Operations (Mobile); TG 7.5 Obscurant, Generator Maintenance; TG 7.6 Obscurant, Storage Operations; TG 9.1 Research Support; TG 9.2 Specialized/Classified and Museum Support; TG 11.1 Vehicle Operations, Driver Qualification; and TG 11.3 Vehicle Maintenance.

  The EPTM Alternative would, when compared to the OPTM (Army's Proposed Action) Alternative, result in a higher level or training readiness and efficiency for **only one** training goal, TG 7.2

Obscurant, Employment Operations Basic (Static). This improved level of readiness is based on the assumption that the water and fog oil recycling manifolds will be effective, and that the amount of time used in this part of obscurant training could be increased without resulting in increased fog oil emissions. However, training flexibility of the collection system has not been assessed to allow for training under any weather conditions, and training in a realistic military operational environment is critical to ensuring a thorough understanding of the effects of meteorological conditions and to train the selection of the proper obscurant and dispersion method.

On the other hand implementation of the EPTM Alternative will result in lower training effectiveness (when compared to the OPTM (Army's Proposed Action) Alternative and RCP Alternative in **six training goals**, including: TG 4.3 GMT, NBC Personal Protective Equipment; TG 4.4 Signals & Other Non-verbal Communications; TG 4.5 Radio Communications, including secure communications; TG 7.4 Obscurant. Employment Operations (Field Training Exercises; TG 10.1 Weapons Training; and TG 11.2 Evasive Driving. These lower training effectiveness ratings are related to (1) the lack of specialized classroom facilities to support training, (2) a decrease in the amount of time allowed for training, and/or (3) a decrease in the level of realism offered by the training methods.

- **Indirect Impacts.** When compared against the RCP Alternative and the OPTM (Army's Proposed Action) Alternative, the EPTM Alternative will reduce the number of facilities that will be constructed by approximately 15 classrooms with a total of approximately 22,500 square feet. This will result in reduced initial construction costs and reduced long-term operations and maintenance costs.

### 5.2.2.17.2 Issue: *Increased Synergistic Effects of Consolidated Training.*

Consolidation of Engineer, Chemical and Military Police training will result in numerous opportunities to improve the support provided by these specialties. Inter-speciality training in basic instruction, maneuver and wartime simulation, as well as other areas will allow the student to improve key communications skills prior to battlefield coordination. The potential for these positive synergistic effects will be greater under the Combined Headquarters and Instruction land use and facility plan as more activities are collocated.

Subsection 5.3.2.17 provides a review of the increased synergistic effects of consolidated training that might be anticipated if this land use and facility plan is implemented, as these effects would be associated with: (1) the location at which the training would be accomplished and (2) the management organization of the schools providing the training. The subsection includes:

- an **Overview** of the goals that will be obtained through increasing the level of synergism at the schools and the formation of the Maneuver Support Center (MANSCEN);

- background information on the **Development and Initial Review of Alternative Land Use Plans**, followed by:

    - the identification and development of the three land use and facility alternatives ((1) Combined Headquarters, (2) Separate Headquarters, and (3) Combined Headquarters and Instruction); and
    - an introduction in a review related to operationally efficiency which was performed to identify the Land Use and Facility Plan for the Army's Proposed Action (including an introduction to the twelve criteria that were developed and used for this review); and

- an **Evaluation** of the operational concept for the consolidation of most of the non-teaching functions of the three schools and provides consolidated non-commissioned officer education systems.

## 5.2.2.18 Summary

This subsection provides a summary (see Table 5.34 and following narrative) of the major positive and adverse impacts of implementing the OPTM (Army's Proposed Action) Alternative, the RCP Alternative, and the EPTM Alternative at sites associated with the Army's Proposed Land Use and Facility Plan.

As summarized in Table 5.34, implementation of the RCP Alternative would result in the greatest potential for environmental impact, while only providing a minimal increase the ability of the schools to support training requirements. In fact, implementation of the RCP Alternative (when compared to the OPTM (Army's Proposed Action) Alternative) would reduce the training effectiveness in six of the forty-three training goals as discussed in 5.2.2.17 above. Implementation of the RCP Alternative will greatly increase the potential for environmental concerns, when compared to either the OPTM or the EPTM training methods. Training goals that would result in higher levels of adverse impact include the following.

As summarized in Table 5.34, implementation of the RCP Alternative will greatly increase the potential for environmental concerns, when compared to either the OPTM or the EPTM training methods, yet would result in reduced training effectiveness scores in six of the forty-three training goals when compared to the OPTM (Army's Proposed Action) Alternative as discussed in 5.2.2.17 above. Training goals that would result in higher levels of adverse impact, if the RCP Alternative were implemented, include the following.

- Training Goal 1.3 Mines and Obstacles, where the training would involve the use of 900 gallons of thickened fuel per training event in an uncontrolled training area, thereby increasing the potential adverse environmental impacts associated with air emissions, surface water and ground water degradation, damage to vegetation in the surrounding area, and impacts to wildlife in the area.

- Training Goal 2.2, BIDS Maintenance; TG 3.2 FOX Maintenance; TG 7.5 Obscurant, Generator Maintenance; TG 4.6 Computer Operations; and TG 11.3 Vehicle Maintenance which would not be restricted to areas that are able to control surface water drainage. Conducting this training in uncontrolled areas could result in accidental spills of POL products on the ground surface, thereby impacting upon surface water and ground water degradation, damage to vegetation in the surrounding area, and impacts to wildlife in the area.

- Training Goal 6.1 NBC Procedures; TG 6.4 NBC Survival Recovery; and TG 8.1 Radiation Safety would maintain the flexibility in the NRC license to allow the use of unsealed radiological materials in exterior training areas (although this training has not been accomplished at FMC and there are not plans to accomplish it at FLW in the future); and

- Training Goal 7.2, Obscurant, Employment Operations, Basic (Static); TG 7.3 Obscurant , Employment Operations, Mobile; and TG 7.4 Obscurant, Employment Operations (Field Training) which would emit up to 125,000 gallons (475,000 liters) of fog oil per year. The quantity of fog oil is approximately double the limit established in the current State of Missouri permit, and exceeds the amount of fog oil that could be emitted within the existing PM-10 standard for the area, based on both the daily and annual limit.

As stated above (and in subsection 5.2.2.17) implementation of the Army's Proposed Training Method (OPTM (Army's Proposed Action) Alternative) would actually improve the training effectiveness when compared to the RCP and the EPTM methods. Implementation of the OPTM would result in the following changes in the potential environmental impacts of the RCP Alternative listed above.

- Greatly reduce the potential for impacts at the FFE deterrents training area (TG 1.3 Mines and Obstacles) by reducing the amount of fuel used to approximately 40% of the current level, plus include a liner under the "wall-of-flame" trench and under two surface water catchment areas that would retain surface water runoff for treatment.

- Training Goal 2.2, BIDS Maintenance; TG 3.2 FOX Maintenance; TG 7.5 Obscurant, Generator Maintenance; TG 4.6 Computer Operations; and TG 11.3 Vehicle Maintenance would be

conduced in areas with controlled surface water runoff so that any inadvertently spilled POL products could be captured.

- Training Goal 6.1 NBC Procedures, TG 6.4 NBC Survival Recovery and TG 8.1 Radiation Safety limits training with unsealed radiological isotopes to a classroom/laboratory environment. Only sealed sources will be used in exterior training. The Army will not construct an alpha field at FLW.

- Training Goal 7.2, Obscurant, Employment Operations, Basic (Static); TG 7.3 Obscurant , Employment Operations, Mobile; and TG 7.4 Obscurant, Employment Operations (Field Training) which would emit up to 84,500 gallons (321,100 liters) of fog oil per year. The quantity of fog oil is up to 20,000 gallons (76,000 liters) per year over the annual limit established in the current State of Missouri permit, and the amount of fog oil that could be emitted within the existing daily PM-10 standard for the area. However this amount would be within the annual PM-10 standard for the area.

Implementation of the OPTM (Army's Proposed Action) would also decrease the amount of initial construction required, to approximately 50 percent of that required to support the RCP Alternative. This reduction in initial construction requirements would be associated with the elimination of many dedicated classrooms, the collocation of similar requirements allowing for the elimination of duplicated facilities, and the sizing of new classrooms to meet anticipated requirements. This reduced level of initial construction (regardless of location) would reduce the anticipated environmental impacts associated with providing classrooms.

Although the implementation of the EPTM Alternative would further reduce the impacts associated with the initial construction effort (when compared to either the OPTM (Army's Proposed Action)), implementation of this alternative would not significantly reduce the potential environmental impacts associated with the issues discussed above.

- The EPTM Alternative would implement the same changes in the FFE deterrents (TG 1.3 Mines and Obstacles) and maintenance (TG 2.2, BIDS Maintenance; TG 3.2 FOX Maintenance; TG 7.5 Obscurant, Generator Maintenance; TG 4.6 Computer Operations; TG 6.1 NBC Procedures, TG 6.4 NBC Survival Recovery; TG 8.1 Radiation Safety; and TG 11.3 Vehicle Maintenance) as specified in the OPTM, and therefore have similar environmental impacts.

- Training Goal 7.2, Obscurant, Employment Operations, Basic (Static); TG 7.3 Obscurant , Employment Operations, Mobile; and TG 7.4 Obscurant, Employment Operations (Field Training) would emit up to 49,500 gallons (188,100 liters) of fog oil per year. The total quantity of fog oil used per year would be within the annual limit established in the current State of Missouri permit, although the maximum daily usage would still exceed the permit limits on an average of one day per quarter.

The further reduction in the amount of initial construction associated with the implementation of the EPTM Alternative would be accomplished through the elimination of several additional dedicated classrooms specified as part of the General Instruction Facility (Project 46090) and Range Modifications (Project 46094)). The lack of these additional, dedicated classroom and simulation areas would degrade training efficiency for TG 4.3 GMT NBC Personnel Protective Equipment; TG 4.4 Signals & Other Non-verbal Communications; TG 4.5 Radio Communications, including secure communications; and TG 11.2 Evasive Driving. This training degradation would result from the loss of specifically designed laboratories that would allow for the control of the training environment, and the increased potential for inclement weather to impact on initial training in these TGs which would be conducted in exterior training areas.

**Table 5.34**
**Summary of Attributes Associated with Implementing Alternative Training Methods at the Army's Proposed Lan**

| | Relocate Current Practice (RCP) | Army Opti |
|---|---|---|
| **Attribute** | **Attributes** | |
| Land Use | Minor changes to the existing land use plan with restricted Area required around CDTF. | Same as RCP |
| Air Quality | **Negative:** Air quality analysis indicates that using up to 125,500 gallons annually and up to 1,900 gallons per day, exceeds National Ambient Air Quality Standards (NAAQS) for annual and 24-hr PM-10 limits. Therefore, noted as significant adverse impacts from fog oil obscurant training. Fort Leonard Wood will train at existing permitted levels until the permit is revised. CDTF thermal treatment unit would be constructed and operated at FLW. | **Positive:** Thermal trea FLW. Air quality analy annually, would be wi **Negative:** Use of up tc 10 daily limits. Therefc oil obscurant training. levels until the permit i |
| Noise | Noise generated from BRAC related training will not modify existing noise contours at FLW. | Same as RCP |
| Water Resources | **Negative:** Analysis indicates the potential for significant adverse impacts to groundwater from Flame Field Expedient weapons training using 900 gallons of fuel per training event, 36,900 gallons per year. The site would not have any environmental controls. | **Positive:** Sediment ba the wall-of-flame traini weapons training area **Negative:** Although th from 900 gallons to 55 per year (60% of RCP |
| Geology and Soils | **Negative:** Analysis indicated the potential for direct significant adverse impacts to soils from Flame Field Expedient weapons training using using 900 gallons of fuel per event, 36,900 gallons per year. | **Positive:** At other cor provided where the sit **Negative:** Same as R( from 900 gallons to 5! RCP). |
| Infrastructure | **Positive:** Sufficient capacity within existing utility systems to meet the increased demand anticipated; the installation has previously operated at this level in 1990. **Negative:** Upgrade and extension of existing utility service lines needed to service CDTF. Congestion at two roadways would require improvements. | Same as RCP. |
| Hazardous/Toxic Materials | **Negative:** There will be an increase in storage and use of the type and quantity of hazardous materials, plus the addition of fog oil, radiological isotopes, and toxic agents at FLW. Exterior radiological training could use unsealed sources. Uncontrolled Flame Field Expedient deterrent training site would require periodic remediation. CDTF decontaminated waste byproducts of toxic agent training disposed through thermal treatment unit. | **Positive:** Reduced qu unsealed radiological i Otherwise same as R( toxic agent training dis |
| Munitions | Overall increase in the amount of munitions used based on increased range activity required by the Chemical and MP students. | Same as RCP |

## PLAN SITES (COMBINED HEADQUARTERS AND INSTRUCTION)

### my's Proposed Land Use and Facility Plan Location

| Army's Proposed Training Method - Optimum Training Method (OPTM) | Environmentally Preferred Training Method (EPTM) |
|---|---|
| **Attributes** | **Attributes** |
| ame as RCP | Same as RCP |
| **ositive:** Thermal treatment unit for CDTF would not be constructed at LW. Air quality analysis indicates that using up to 84,500 gallons nnually, would be within annual NAAQS PM-10 limits. **egative:** Use of up to 1,200 gallons per day would exceed 24-hr PM-0 daily limits. Therefore noted as significant adverse impact from fog l obscurant training. Fort Leonard would train at existing permitted vels until the permit is revised. | **Positive:** Thermal treatment unit for the CDTF would not be constructed at FLW. Air quality analysis indicates that using up to 49,500 gallons annually would be within annual NAAQS PM-10 lir **Negative:** Use of up to 1,200 gallons per day would exceed 24-h 10 daily limits. Therefore noted as significant adverse impact fror oil obscurant training. Fort Leonard would train at existing permit levels until the permit is revised. |
| ame as RCP | Same as RCP; except the use of modified Mark-19 training round would reduce noise impacts. |
| **ositive:** Sediment basins and a below ground impermeable liner for e wall-of-flame training will be constructed at Flame Field Expedient eapons training area to control unburned fuel.. **egative:** Although the training will require reduced fuel requirements om 900 gallons to 550 gallons per event, it will still use 22,550 gallons er year (60% of RCP). | Same as OPTM. |
| **ositive:** At other construction sites, sediment control basins are ovided where the site clearing is greater than five acres. **egative:** Same as RCP; except the amount of fuel used is reduced om 900 gallons to 550 gallons per event, 22,550 per year (60% of the CP). | Same as OPTM. |
| ame as RCP. | Same as RCP. |
| **ositive:** Reduced quantity of fog oil usage compared to RCP. No nsealed radiological isotopes used in the exterior field training. therwise same as RCP. CDTF decontaminated waste byproducts of xic agent training disposed off site by commercial contract. | **Positive:** Further reductions in the amount of fog oil used when compared to OPTM and RCP. Other elements are the same as |
| ame as RCP | Same as RCP, except reduced amount of high explosives for the Mark 19. |

| d Use and Facility Plan Location | |
|---|---|
| 's Proposed Training Method - mum Training Method (OPTM) | Environmentally Preferred Training Method (EPTM) |
| Attributes | Attributes |
| | Same as RCP |
| tment unit for CDTF would not be constructed at sis indicates that using up to 84,500 gallons hin annual NAAQS PM-10 limits. 1,200 gallons per day would exceed 24-hr PM- re noted as significant adverse impact from fog Fort Leonard would train at existing permitted s revised. | **Positive:** Thermal treatment unit for the CDTF would not be constructed at FLW. Air quality analysis indicates that using up to 49,500 gallons annually would be within annual NAAQS PM-10 limits. **Negative:** Use of up to 1,200 gallons per day would exceed 24-hr PM-10 daily limits. Therefore noted as significant adverse impact from fog oil obscurant training. Fort Leonard would train at existing permitted levels until the permit is revised. |
| | Same as RCP; except the use of modified Mark-19 training rounds would reduce noise impacts. |
| sins and a below ground impermeable liner for g will be constructed at Flame Field Expedient to control unburned fuel.. training will require reduced fuel requirements gallons per event, it will still use 22,550 gallons | Same as OPTM. |
| struction sites, sediment control basins are clearing is greater than five acres. P; except the amount of fuel used is reduced 0 gallons per event, 22,550 per year (60% of the | Same as OPTM. |
| | Same as RCP. |
| ntity of fog oil usage compared to RCP. No otopes used in the exterior field training. P. CDTF decontaminated waste byproducts of osed off site by commercial contract. | **Positive:** Further reductions in the amount of fog oil used when compared to OPTM and RCP. Other elements are the same as OPTM. |
| | Same as RCP, except reduced amount of high explosives for the Mark 19. |

**Table 5.34**
**Summary of Attributes Associated with Implementing Alternative Training Methods at the Army's Proposed Land Use an**

| | Relocate Current Practice (RCP) | Army's Propo Optimum Tra |
|---|---|---|
| **Attribute** | **Attributes** | **A** |
| Permits/Regulatory Authority | **Positive:** Permit requirements and regulations protect human health and the environment through the permitting/licensing process and compliance with regulations.<br>**Negative:** The BRAC action under the RCP would require modification of and/or acquisition of additional permits associated with air quality management. The current air permit for the Static, Mobile and Field Fog Oil Obscurant Training does not allow for full implementation of the RCP alternative. | Same as RCP, however, PM-10 for RCP. |
| Biological Resources | | |
| a. T & E Species | **Positive:** No effects of fog oil training to bald eagles.<br>**Negative:** Certain training activities may affect T&E species. Wintering bald eagles, on Roubidoux Creek and Big Piney River, and foraging and hibernating Indiana and gray bats may be adversely impacted by TPA grenades and TPA smoke pots used in training. Static and mobile fog oil training may adversely affect foraging and hibernating Indiana and gray bats. | **Positive:** A Biological Opinion Consultation is continuing with t (USFWS) to develop monitoring use for training materials and ac reduced under this alternative w<br>**Negative:** Same as RCP. |
| b. Other Protected Species | **Negative**: Training activities will cause some localized adverse impacts to other protected species, particularly at Mine and Obstacles Training site, which has no environmental controls under this training method. | **Positive:** Environmental contro into the soil, prevent runoff acro training are included in the proje<br>**Negative**: Same as RCP, exce adverse impacts ( reduced from event). |
| c. Wetlands | **Negative:** Minor operational impacts to wetlands and stream crossings. | Same as RCP |
| d. Aquatic Resources | **Negative:** Vehicle training operations would occur in lakes and ponds with the potential for petroleum products to enter the water. Decontamination training in the field will use antifreeze for simulated agent; this will be washed off onto the land and streams. Stream crossings would have localized and downstream impact. | **Negative:** Stream crossings w<br>**Positive:** Vehicle training opera designed and constructed for ri alcohol based fluid, which is rel specified, replaces antifreeze a |
| e. Terrestrial Resource | **Negative:** Maneuver activities and mobile smoke training vehicles will adversely impact vegetation | Same as RCP. |
| Cultural Resources | **Positive:** Areas to used for BRAC have been surveyed for cultural resources. There are no impacts to cultural resources | Same as RCP |
| Sociological Environment | No changes related to training activities. | Same as RCP |
| Economic Development | **Positive:** There would be significant short-term and long-term economic benefits from the realigned missions and training program. | Same as RCP |

| d Use and Facility Plan Location | |
|---|---|
| y's Proposed Training Method - imum Training Method (OPTM) | Environmentally Preferred Training Method (EPTM) |
| **Attributes** | **Attributes** |
| er, PM-10 offsets requirements would be less than | **Positive:** Same as RCP, except the current air quality permit for the Fog Oil Obscurant Training allows for implementation of the EPTM alternative annual amount but the daily usage identified would require a permit modification. |
| | |
| l Opinion has been issued with a take statement. ıing with the US Fish and Wildlife Service nonitoring plans. The amounts and frequency of ąls and activities that may cause an effect are ernative when compared to RCP. RCP. | **Positive:** See as RCP. The amounts and frequency of use for training materials and activities that may cause an effect will be further reduced under this alternative when compared to RCP and OPTM. No impact identified for bald eagles from static or mobile smoke training. No impact from static smoke training for foraging Indiana and gray bats. **Negative:** Wintering bald eagles, on Roubidoux Creek and Big Piney River, and foraging and hibernating Indiana and gray bats may be adversely impacted by TPA grenades and TPA smoke pots used in training. For hibernating Indiana or gray bats, impacts for mobile smoke training remains the same as identified for RCP. |
| ıtal controls to prevent migration of unburned fuel ınoff across the for the Mine and Obstacles ı the project. ICP, except less fuels used in training will reduce ıced from 900 gallons to 550 gallons per training | Same as OPTM. |
| | Same as RCP |
| ıssings would have localized adverse impact. ıing operations would occur at a pond specifically ;ted for river crossing training. A substitute ıich is relatively non-toxic in the quantities ifreeze as the simulated decontamination fluid. | **Positive:** Same as OPTM. |
| | Same as RCP. |
| | Same as RCP |
| | Same as RCP |
| | Same as RCP |

**Table 5.34**
**Summary of Attributes Associated with Implementing Alternative Training Methods at the Army's Proposed Land Use and F**

| | Relocate Current Practice (RCP) | Army's Propose Optimum Traini |
|---|---|---|
| **Attribute** | **Attributes** | **Att** |
| Quality of Life | **Negative:** Increased training area utilization for obscurant training at would reduce the time allowed for persons to use the hunting areas on the installation. | **Negative:** Same as RCP. |
| Human Health and Safety | **Negative:** Fog oil has very limited toxicity; occupational health risks occur from prolonged exposure only at 5 $mg/m^3$ or greater, which would occur only in the vicinity of the smoke generators. All training would occur in accordance with standard operating procedures requiring the wearing of respirators for those in high concentrations in order to protect personnel from unnecessary risks. Air dispersion great enough to reduce fog oil to concentrations meeting National Ambient Air Quality Standards in the cantonment and at FLW boundary. All training activities, including the use of obscurants, munitions, and radiological isotopes, will be conducted in accordance with all Army safety procedures and Federal, state, and local laws and regulations. | Same as RCP; reduced annual us reduce exposure to fog oil. |
| Installation Agreements | Additional agreements will be prepared as the Chemical School and MP School, and supporting units arrive at FLW. | Same as RCP |
| Operational Efficiency | **Positive:** The collocation of the training of Chemical and Military Police students with Engineer students will provide the opportunity to train these maneuver support elements together as a team. The amount of fog oil to be used would provide for longer training and best development of skills for three training goals (related to obscurant training) out of the 43 total training goals evaluated.<br>**Negative:** When compared to the OPTM, 16 of the 43 training goals are noted to be less operationally preferred and six of the 43 would result in lower training effectiveness. | **Positive:** The collocation of the tr students with Engineer students w these maneuver support elements training goals evaluated, 16 were i efficiency when compared to the R in training effectiveness when com to the EPTM, this alternative provi more effective field training, therefo trained soldiers. |

*Source: Harland Bartholomew & Associates, Inc.*

| Use and Facility Plan Location | |
|---|---|
| **s Proposed Training Method - ıum Training Method (OPTM)** | **Environmentally Preferred Training Method (EPTM)** |
| **Attributes** | **Attributes** |
| ;P. | **Negative:** Same as RCP. |
| annual usage of fog oil will correspondingly oil. | Same as RCP; reduced annual usage of fog oil less than identified for OPTM will further reduce exposure to fog oil. |
| | Same as RCP |
| ɔn of the training of Chemical and Military Police students will provide the opportunity to train t elements together as a team. Of the 43 , 16 were identified as improving in operational ed to the RCP Alternative and six would improve when compared to the EPTM. When compared ative provides for more realism resulting from ing, therefore developing better skills and better | **Positive:** The collocation of the training of Chemical and Military Police students with Engineer students will provide the opportunity to train these maneuver support elements together as a team.<br>**Negative:** The training effectiveness would be lower in six training goals when compared to the RCP Alternative and six training goals when compared to the OPTM Alternative, including one critical key chemical school military occupational skill specialty, obscurant field training. |
| | |

# SUBSECTION 5.2.3

# Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative →<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.20; Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5-32; Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| 4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)<br>Training Alternatives: RCP Alternative; OPTM Alternative (Army's Proposed); EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.21; Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.33; Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative →<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.22; Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.34; Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.2.3 ANALYSIS OF TRAINING ALTERNATIVES IN ASSOCIATION WITH ALTERNATIVE 1 LAND USE AND FACILITY PLAN (Combined Headquarters)

### 5.2.3.1 Introduction

The following analysis identifies impact issues associated with implementation of the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives in association with facility locations as specified in Alternative 1 LU & FP (CH). Impact Matrix 2, located in Volume II, provides a graphic display of impacts described in this subsection. Where applicable, the impact discussions refer to information provided in subsection 5.2.2 to minimize duplication of the text.

A copy of Figure 5.1 has been reprinted on the backside of the divider sheet preceding this section to assist the reviewer in understanding the analysis. A modified version of Table 5.1 has also been provided below as Table 5.35 to assist in this effort. The shaded column in Table 5.35 reflects the processes covered in this Analysis of Training Alternatives in Association with Alternative 1 Land Use and Facility Plan (Combined Headquarters).

Subsection 5.2.3.18 provides a summary of this analysis.

**Table 5.35:**
**Matrix Display of Step 1 (Subsections 5.2.2 through 5.2.4) Training Analysis Subsection Numbers**

| Subsection or Impact Analysis Categories | Subsection Numbers - Training Alternatives in Association with Army's Proposed LU & FP (CH&I) (Subsection 5.2.2) | Subsection Numbers - Training Alternatives in Association with Alternative 1 LU & FP (CH) (Subsection 5.2.3) | Subsection Numbers - Training Alternatives in Association with Alternative 2 LU & FP (SH) (Subsection 5.2.4) |
|---|---|---|---|
| Introduction | 5.2.2.1 | 5.2.3.1 | 5.2.4.1 |
| Land Use & Training Areas | 5.2.2.2 | 5.2.3.2 | 5.2.4.2 |
| Air Quality and Climate | 5.2.2.3 | 5.2.3.3 | 5.2.4.3 |
| Noise | 5.2.2.4 | 5.2.3.4 | 5.2.4.4 |
| Water Resources | 5.2.2.5 | 5.2.3.5 | 5.2.4.5 |
| Floodplains/Surface Water | 5.2.2.5.A | 5.2.3.5.A | 5.2.4.5.A |
| Hydrology/Groundwater | 5.2.2.5.B | 5.2.3.5.B | 5.2.4.5.B |
| Geology and Soils | 5.2.2.6 | 5.2.3.6 | 5.2.4.6 |
| Infrastructure | 5.2.2.7 | 5.2.3.7 | 5.2.4.7 |
| Hazardous/Toxic Materials | 5.2.2.8 | 5.2.3.8 | 5.2.4.8 |
| Munitions | 5.2.2.9 | 5.2.3.9 | 5.2.4.9 |
| Permits/Regulatory Authority | 5.2.2.10 | 5.2.3.10 | 5.2.4.10 |
| Biological Resources | 5.2.2.11 | 5.2.3.11 | 5.2.4.11 |
| Federal T & E Species | 5.2.2.11.A | 5.2.3.11.A | 5.2.4.11.A |
| Other Protected Species | 5.2.2.11.B | 5.2.3.11.B | 5.2.4.11.B |
| Wetlands | 5.2.2.11.C | 5.2.3.11.C | 5.2.4.11.C |
| Aquatic Resources | 5.2.2.11.D | 5.2.3.11.D | 5.2.4.11.D |
| Terrestrial Resources | 5.2.2.11.E | 5.2.3.11.E | 5.2.4.11.E |
| Cultural Resources | 5.2.2.12 | 5.2.3.12 | 5.2.4.12 |
| Sociological Environment | 5.2.2.13 | 5.2.3.13 | 5.2.4.13 |
| Economic Development | 5.2.2.14 | 5.2.3.14 | 5.2.4.14 |

| Table 5.35: Matrix Display of Step 1 (Subsections 5.2.2 through 5.2.4) Training Analysis Subsection Numbers | | | |
|---|---|---|---|
| **Subsection or Impact Analysis Categories** | **Subsection Numbers - Training Alternatives in Association with Army's Proposed LU & FP (CH&I) (Subsection 5.2.2)** | **Subsection Numbers - Training Alternatives in Association with Alternative 1 LU & FP (CH) (Subsection 5.2.3)** | **Subsection Numbers - Training Alternatives in Association with Alternative 2 LU & FP (SH) (Subsection 5.2.4)** |
| Quality of Life | 5.2.2.15 | 5.2.3.15 | 5.2.4.15 |
| Quality of Life | 5.2.2.15.A | 5.2.3.15.A | 5.2.4.15.A |
| Human Health and Safety | 5.2.2.15.B | 5.2.3.15.B | 5.2.4.15.B |
| Installation Agreements | 5.2.2.16 | 5.2.3.16 | 5.2.4.16 |
| Operational Efficiency | 5.2.2.17 | 5.2.3.17 | 5.2.4.17 |
| Summary | 5.2.2.18 | 5.2.3.18 | 5.2.4.18 |
| *Source: Harland Bartholomew & Associates, Inc.* | | | |

## 5.2.3.2 Land Use & Training Areas

Implementation of the planned BRAC training objectives at FLW will affect the following factors under this resource category:

- Reallocation of existing land use areas; and
- Establishment of a new buffer area surrounding the CDTF.

**5.2.3.2.1 Issue: *Reallocation of Existing Land Use Areas.*** As discussed in subsection 5.2.2.2, implementation of BRAC actions will result in the movement of training and mission related activities that were unforeseen during the development of the existing Master Plan/Land Use Plan for FLW (FLW, 1991c). These activities will increase the demand for both training and support facilities.

Implementation of the three training method (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives for this issue are identical. The existing Master Plan/Land Use Plan included areas for expansion within the established land use areas, these zones were sized based on potential changes in mission that were anticipated at the time the plan was developed. As the proposed BRAC action was not identified at the time of the Master Plan, the zones were not sized to accommodate the required activities and spatial requirements associated with the realigned missions being assigned to FLW.

- **Direct Impacts.** Implementation of Alternative 1 LU &FP (CH) will result in no change in the land use pattern for the non-cantonment training areas. However implementation of this plan will result in the following changes to the existing, approved land use plan (for approximately 76.9 acres) within the cantonment (built-up) area of the installation:
    - conversion of a troop housing area at the northern end of the 600-area barracks to administrative use (approximately 21 acres);
    - conversion of a troop housing area along the western side of the 1000-area barracks to administrative use (approximately 15 acres);
    - conversion of an industrial area southwest of the intersection of Alabama and South Dakota avenues to training (approximately 27 acres);
    - conversion of an approximately 400-foot by 100-foot area near the intersection of East Fourth Street and Louisiana Avenue from reserved buffer to industrial and adjustment of the existing buffer area between the Industrial area and the troop housing area near the intersection of Oklahoma Avenue and East Fourth Street to provide isolation of the expanded industrial area (approximately 0.9 acres);
    - conversion of an area south east of Nebraska Avenue (currently used for a U.S. Army

Reserve Motor Pool to training use (approximately 10.2 acres); and
- conversion of a recreation area to community facilities land use northeast of the intersection of Jordan Road and South Dakota Avenue (approximately 2.8 acres).

An illustration of these areas is provided on Figure 3.4, Alternative 1 LU & FP (CH) located in Section 3 of the EIS. Conversion of the area within the 1000-area is compatible with the existing land uses in the area; however, conversion of the northern half of the 600-area barracks to administrative Use would be incompatible with existing Basic Training related functions that are located in the southern half of the 600-area. A primary element in Basic Training is the isolation of trainees from outside influences, this is currently accomplished by having an area dedicated to this function. The introduction of other activities into this area would increase the number and frequency of outside influences, reducing the effectiveness of Basic Training. The conversion of the area near the intersection of Jordan Road and South Dakota Avenue will have a beneficial impact on the overall land use pattern of the installation.

- **Indirect Impacts.** Implementation of this land use plan would isolate the Chemical Museum and Military Police Museum facilities from the existing U.S. Army Engineer and Fort Leonard Wood Museum and World War II era building display. This will reduce the functional efficiency of these related functions by limiting the ability of visitors to review the information contained in each of the collections. The isolated nature of the museums in this land use plan would also limit the potential of combining the staffs to reduce overhead labor costs.

#### 5.2.3.2.2 Issue: *Establishment of a New Buffer Area Surrounding the CDTF.*

Implementation of Alternative 1 LU & FP (CH), will change the location but not the extent of impacts associated with establishment and operation of the CDTF. As discussed in subsection 5.2.2.2.2, no direct impacts on surrounding functions are anticipated. Indirect impacts would be as noted in subsection 5.2.2.2.2.

### 5.2.3.3 Air Quality and Climate

Implementation of the Alternative 1 LU & FP (CH) will alter the locations specified for training, but will result in significantly different direct or indirect impacts on air quality that are not already described in the Army's Proposed LU & FP (CH&I) discussed in subsection 5.2.2.3. It should be noted, that the air quality permit is location specific and any location changes would require FLW to pursue a permit modification.

### 5.2.3.4 Noise

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Noise:

- Modification of Installation Compatible Use Zones (ICUZ);
- Mobile source (vehicular) noise; and
- Noise impacts on Biological Resources.

#### 5.2.3.4.1 Issue: *Modification of Installation Compatible Use Zones.*

With the exception of the weapons training requirements, the impacts on Installation Compatible Use Zone associated with this area will be similar to the analysis in subsection 5.2.2.4. The relocation of ranges as specified in this land use plan will shift the noise level associated with the range activity, and depending upon the training method selected Mark 19 training will result in different noise impacts.

##### 5.2.3.4.1.1 RCP and OPTM (Army's Proposed Action) Alternatives

- **Direct Impacts.** As discussed in subsection 5.2.2.4.1.1, the RCP and OPTM (Army's Proposed Action) Alternatives will use standard, high-explosive and modified training rounds for Mark 19 training. Implementation of this land use plan will locate Mark 19 grenade training at a new range

located near the Cannon Range aerial bombardment area. The closest sensitive land uses are residences north of the town of Palace. These residences are approximately 4.8 miles (7.7 kilometers) east-southeast of the Cannon Range target area.

As discussed in 5.2.2.4.1.1, the anticipated impact of the Mark 19 training at 1.8 miles (3 km) would be less than 35 dB (USACHPPM, 1996). Therefore, the Mark 19 range can be built at the Army's Proposed LU & FP (CH&I) location, or the Alternative 1 LU & FP (CH) Range location, without significantly degrading the noise environment of the people occupying the closest sensitive land uses.

**5.2.3.4.1.2 EPTM Alternative.** As discussed in Training Goal 10.1, and in subsection 5.2.2.4.1.2 implementation of the EPTM Alternative will involve the use of approximately 30 modified training Mark 19 rounds by each U.S. Army student and 24 modified training Mark 19 rounds by each U.S. Marine Corps student. Implementation of this alternative will result in the use of approximately 122,620 modified training rounds annually for Mark 19 training and no high-explosive rounds (Table 5.14). In addition, this training will include the use of the other ammunition and explosives listed on Table 5.13.

- **Direct Impacts.** The use of only modified training rounds with the EPTM Alternative will reduce the level of noise associated with the impact and explosion of Mark 19 rounds. Therefore, the implementation of the additional range training, including the Mark 19 training, as part of the EPTM at the range locations specified in the Alternative 1 LU & FP (CH) will result in slight increases in the amount of noise impacts experienced in the surrounding community. These additional impacts are not anticipated to significantly degrade the existing noise environment of the people occupying the closest sensitive land uses.

**5.2.3.4.2 Issue: *Mobile Source (Vehicular) Noise.*** Each of the training methods will generate similar increases in vehicle use and the resulting noise levels. Based upon the locations at which training activities are scheduled for implementation under this land use plan, vehicle noise will be concentrated in two locations: near the Engineer Headquarters and near the intersection on Iowa Avenue and South Dakota Avenue. These two locations will experience increased noise levels, but the increase in noise should not impact surrounding land uses.

**5.2.3.4.3 Issue: *Noise Impacts on Biological Resources.*** See subsection 5.2.2.4.3.

## 5.2.3.5 Water Resources

## 5.2.3.5.A Surface Water and Floodplains

The following issues were identified with the implementation of the planned BRAC training goals at FLW:

- Deposition of fog oil obscurant;
- Accidental spills of fog oil;
- Maintenance training and operations;
- Runoff from training and maneuver areas;
- Release of unburned fuels from FFE deterrents training; and
- In-stream crossings or in-lake vehicle operations.

**5.2.3.5.A.1 Issue: *Deposition of Fog Oil Obscurant.*** As discussed in subsection 5.2.2.5.A.1 and 5.2.2.B.11.4, concentrations of fog oil reaching surface waters through deposition and runoff would not create noticeable changes in water quality parameters.

Obscurant training under the Alternative 1 LU & FP (CH) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Babb Airfield (Smith Branch), Musgrave Hollow, Wolf Hollow, and Ballard Hollow. These drainage areas differ from the Army's Proposed LU &FP (CH&I) by

conducting mobile training within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and McCann Hollow. These drainage areas are all tributaries of Roubidoux Creek. Impacts to the drainage areas would remain as discussed in subsection 5.2.2.5.A.1.

**5.2.3.5.A.2 Issue: *Accidental Spills of Fog Oil.*** Obscurant training under the Alternative 1 LU & FP (CH) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Babb Airfield (Smith Branch), Musgrave Hollow, Wolf Hollow, and Ballard Hollow. These drainage areas differ from the Army's Proposed LU & FP (CH&I) by conducting mobile training within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and McCann Hollow. Storage operations would remain in the same location as in the Army's Proposed U & FP (CH&I). These drainage areas are all tributaries of Roubidoux Creek. Impacts to the drainage areas would remain as discussed in subsection 5.2.2.5.A.2.

**5.2.3.5.A.3 Issue: *Maintenance Training and Operations.*** Under the Alternative 1 LU & FP (CH), maintenance training and operations would occur within the same locations as discussed in the Army's Proposed LU & FP (CH&I). Therefore, impacts to surface waters would remain as discussed in subsection 5.2.2.5.A.3.

**5.2.3.5.A.4 Issue: *Runoff From Training and Maneuver Areas.*** See subsection 5.2.2.5.A.4 for a discussion of this issue.

**5.2.3.5.A.4.1 RCP Alternative.** Training goals associated with the movement of personnel, vehicles and equipment (TG 1.2, TG 1.8, TG 2.1, TG 3.1 and TG 10.1) would be located as discussed in subsection 5.2.2.5.A.4.1. A long-term indirect adverse impact would occur as discussed in subsection 5.2.2.5.A.4.1.

TG 6.2 NBC Equipment would occur at the following sites: Penn's Pond (north); Penn's Pond (south); pond south of TA 243; pond at TA 238; pond in McCann Hollow; and Roubidoux Creek (south). Impacts to surface waters will occur as discussed in subsection 5.2.2.5.A.4.1.

Obscurant training under the Alternative 1 LU & FP (CH) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Babb Airfield (Smith Branch), Musgrave Hollow, Wolf Hollow, and Ballard Hollow. These drainage areas differ from the Army's Proposed LU & FP (CH&I) by conducting mobile training within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and McCann Hollow. These drainage areas are all tributaries of Roubidoux Creek. Impacts to the drainage areas would remain as discussed in subsection 5.2.2.5.A.4.1.

**5.2.3.5.A.4.2 OPTM (Army's Proposed Action) and EPTM Alternative.** Training goals associated with the movement of personnel, vehicles and equipment (TGs 1.2, 1.8, 2.1, 3.1 and 10.1) would be located as discussed in subsection 5.2.2.5.A.4.2. A long-term indirect adverse impact would occur as discussed in subsection 5.2.2.5.A.4.2.

As discussed in subsection 5.2.3.5.A.4.1, Mobile and Field Obscurant Employment Operations would be conducted within tributaries of Roubidoux Creek. Impacts would remain as discussed in subsection 5.2.2.5.A.4.2.

**5.2.3.5.A.5 Issue: *Release of Unburned Fuels from FFE deterrents Training.*** See subsection 5.2.2.5.A.5 for a discussion of this issue.

Alternative 1 LU & FP (CH) for training with Mine and Obstacles Designed to Prevent Movement (TG 1.3) is located at Range 27 (Bailey Hollow). As in the Army's Proposed LU & FP (CH&I), Bailey Hollow is also a tributary of Roubidoux Creek.

- **Direct Impacts.** The repeated released of unburned fuel into the environment at the training site has the potential to cause long-term indirect adverse impact to surface waters in a seasonal creek that runs proximate to the northern edge of the FFE deterrent training area.

- **Indirect Impacts.** The repeated released of unburned fuel into the environment at the training site has the potential to cause long-term indirect adverse impact to surface waters.

**5.2.3.5.A.6 Issue: *In-stream Crossings or In-lake Vehicle Operations.*** See subsection 5.2.2.5.A.6 for a discussion of this issue.

**5.2.3.5.A.6.1 RCP Alternative.** As in the Army's Proposed LU & FP (CH&I), field maneuver operations associated with TGs 1.2, 2.1 and 3.1 would be conducted within an available training range. Impacts to streams crossed would remain as discussed in subsection 5.2.2.5.A.6.1.

In-lake maneuver operations associated with TG 3.1 FOX Battlefield Employment under Alternative 1 LU & FP (CH) would be conducted within Penn's Pond. Unlike TA 250 in the Army's Proposed LU & FP (CH&I), Penn's Pond is used for recreational activities and is not currently designed for in-lake maneuver operations. Such operations could redistribute and increase the suspended solids in the lake. Contaminants (oils, grease or fluids) could wash off the vehicles directly into Penn's Pond. As a result, a direct long-term adverse impact would occur.

Obscurant training under the Alternative 1 LU & FP (CH) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Babb Airfield (Smith Branch), Musgrave Hollow, Wolf Hollow, and Ballard Hollow. These drainage areas differ from the Army's Proposed LU & FP (CH&I) by conducting mobile training within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and McCann Hollow. These drainage areas are all tributaries of Roubidoux Creek. Impacts to the drainage areas would remain as discussed in subsection 5.2.2.5.A.6.1.

**5.2.3.5.A.6.2 OPTM (Army's Proposed Action) and EPTM Alternative.** Impacts under the OPTM (Army's Proposed Action) and EPTM Alternatives would occur as discussed in the RCP Alternative subsection 5.2.3.5.A.6.1.

During obscurant operations (TG 7.3 and TG 7.4) the difference between the RCP Alternative and the OPTM (Army's Proposed Action) and EPTM Alternative is the quantity of fog oil being used. Since the quantity of fog oil used during training does not affect whether or not a stream is crossed, impacts would remain as discussed in subsection 5.2.3.5.A.6.1.

## 5.2.3.5.B Hydrogeology/Ground Water

This section examines the potential effects of the BRAC training objectives on the groundwater at the installation under the Alternative 1 LU & FP (CH). This section will only consider the differences of this land use plan relative to the Army's Proposed LU & FP (CH&I).

**5.2.3.5.B.1 Issue: *Off-road Vehicle Operations on Training and Maneuver Areas.*** The impacts associated with this issue are the same as those discussed in subsection 5.2.2.5.B.1 for the Army's Proposed LU & FP (CH&I).

**5.2.3.5.B.2 Issue: *Release of unburned fuels from FFE deterrents training.*** Under the Alternative 1 LU & FP (CH), this training will be conducted at Range 27, which is in generally the same location as under the Army's Proposed LU & FP (CH&I). Therefore, the impacts will be the same as described in subsection 5.2.2.5.B.2.

**5.2.3.5.B.3 Issue: *Seismic Activity.*** Under the Alternative 1 LU & FP (CH), the Chemical Defense Training Facility will be constructed at the southern edge of the cantonment area. Impacts from seismic activity would remain the same as was discussed for the Army's Proposed LU & FP (CH&I) in subsection 5.2.2.5.B.3.

**5.2.3.5.B.4 Issue: *Deposition of Fog Oil Obscurant.*** This training would be conducted at different sites under the Alternative 1 LU & FP (CH) compared to the Army's Proposed LU & FP (CH&I). However, the site of the training will not alter the finding that fog oil will not likely accumulate in the soil. Therefore, the impacts will be the same as discussed in subsection 5.2.2.5.B.4.

**5.2.3.5.B.5 Issue: *Maintenance Training and Operations.*** Under the Alternative 1 LU & FP (CH), maintenance training and operations would occur within the same locations as discussed in the Army's Proposed LU & FP (CH&I). Therefore, impacts to ground water would remain as discussed in subsection 5.2.2.5.B.5.

## 5.2.3.6 Geology and Soils

This section examines the potential effects of the BRAC training objectives on the soil and geology at the installation under the Alternative 1 LU & FP (CH). This section will only consider the differences of this land use plan relative to the Army's Proposed LU & FP (CH&I).

**5.2.3.6.1 Issue: *Off-road Vehicle Operations on Training and Maneuver Areas.*** The impacts associated with this issue are the same as those discussed in subsection 5.2.2.6.1 for the Army's Proposed LU & FP (CH&I).

**5.2.3.6.2 Issue: *Release of Unburned Fuels from FFE deterrents Training.*** Under the Alternative 1 LU & FP (CH), this training will be conducted at Range 27, which is in the same general area as the training site under the Army's Proposed LU & FP (CH&I). Therefore the impacts will be the same as in subsection 5.2.2.6.2.

**5.2.3.6.3 Issue: *Seismic Activity.*** Under the Alternative 1 LU & FP (CH), the Chemical Defense Training Facility will be constructed at the southern edge of the cantonment area. Impacts from seismic activity would remain the same as was discussed for the Army's Proposed LU & FP (CH&I) in subsection 5.2.2.6.3.

**5.2.3.6.4 Issue: *Deposition of Fog Oil Obscurant.*** Obscurant training under the Alternative 1 LU & FP (CH) would be conducted within the following areas: Static - Bailey Hollow; Mobile and Field - near Babb Airfield, Musgrave Hollow, Wolf Hollow, and Ballard Hollow. These drainage areas differ from the Army's Proposed LU & FP (CH&I) by conducting mobile training near Babb Airfield and within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and McCann Hollow. Training at these locations would not produce an impact different from the Army's Proposed LU & FP (CH&I) discussed in subsection 5.2.2.6.4.

**5.2.3.6.5 Issue: *Maintenance Training and Operations.*** Under the Alternative 1 LU & FP (CH), maintenance training and operations would occur within the same locations as discussed in the Army's Proposed LU & FP (CH&I). Therefore, impacts to soil would remain as discussed in subsection 5.2.2.6.5.

## 5.2.3.7 Infrastructure

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Infrastructure:

- Adequacy of existing utility systems;
- Energy usage; and
- Adequacy of existing roadways.

**5.2.3.7.1 Issue: *Adequacy of Existing Utility Systems.*** As described in subsection 5.2.2.7.1, the capacities of the utility systems are adequate to service the anticipated increase in the effective population. Increases to the population at various locations throughout the installation may dictate the need for new or modified service connections to handle the increased demand. Most of these connections and modifications should not cause an adverse impact. Modifications and extension of services will be required for the CDTF and the Evasive Driving Area due to the remote site locations required by TG 6.3 Advanced NBC Decon Training and TG 11.2 Evasive Driving Training.

The general policy at FLW is that remote training areas are serviced with electricity only; water and wastewater services are provided by portable means. Due to the nature of training at the CDTF and the classroom requirement for Evasive Driving Training services to be provided to these facilities include: water, wastewater, and natural gas.

**5.2.3.7.1.1 RCP and OPTM (Army's Proposed Action) Alternative**

- **Indirect Impact.** A potential long-term, adverse impact would occur with the need to extend additional utility lines to the CDTF and the Evasive Driving Training area. Under the Alternative 1 LU & FP (CH), the CDTF site is located approximately 2 miles (3.2 kilometers) southwest of the cantonment area and the Evasive Driving Training is located approximately 2.5 miles (4 kilometers) southwest of the cantonment area. Potable water, sewage, and natural gas do not currently service these areas. To connect the facilities to the installation's existing systems would require extending the existing utility lines from the cantonment areas. The creation of additional utility lines would increase the maintenance required by the utility service providers and would therefore result in a long-term adverse impact associated with the Advanced NBC Decon Training and Evasive Driving Training. A more detailed assessment of the utility needs and the associated construction requirements at these training areas are discussed in subsection 5.3.3.7.

**5.2.3.7.1.2 EPTM Alternative**

- **Direct Impact.** The impact of the EPTM Alternative for the Advanced NBC Decon Training is the same as described above in subsection 5.2.3.7.1.1. No natural gas, sewage, or water service would be provided to the Evasive Driving Training area under the EPTM Alternative. Therefore no adverse impact would be anticipated by the utilities required to service this training area.

**5.2.3.7.2 Issue: *Energy Usage.*** The increase in effective population and the increase in facilities at FLW will result in an increase in the energy consumption by the installation. The increased effective population associated with the BRAC action would be the same regardless of the land use alternative selected. Therefore, the impacts associated with this issue are the same as described in subsection 5.2.2.7.2.

**5.2.3.7.3 Issue: *Adequacy of Existing Roadways.*** Implementation of the Alternative 1 LU & FP (CH) will disburse new facilities and training areas across the installation. The existing cantonment area roadway system will be adequate to support this land use plan. Implementation of the proposed training actions will also require the repair, expansion and modernization of several roads and road segments within the range and training areas. These repairs, expansions and modernizations will be accomplished as part of additional maintenance as a part of the Range Modifications (Project 46094) construction.

- **Indirect Impact.** The repair, expansion and modernization of roads and road segments near the ranges and training areas will result in improved (routine and emergency) access to these areas. All of the roads and road segments near the range and training areas are designed for restricted access and are not used by through traffic, consequently the utility of the improved access will be limited.

## 5.2.3.8 Hazardous Materials

Implementation of the proposed action will result in the following issues with respect to hazardous or toxic materials.

- Release of unburned fuels from FFE deterrents training;
- Maintenance training and operations;
- Increase in types and quantities of hazardous materials;
- Increase in types and quantities of radiological isotopes;
- Introduction of toxic agents; and
- Release of fog oil obscurant.

The same quantities and types of hazardous materials would be used regardless of the land use alternative selected. The location where the hazardous materials are to be used at FLW has the potential to create additional impacts to other environmental resource categories. The handling and disposal of hazardous wastes, special wastes, and medical wastes will follow the descriptions provided in subsection 5.2.2.8. Discussion of each issue and its anticipated impact is presented in subsection 5.2.2.8.

## 5.2.3.9 Munitions

The same quantities and types of munitions would be used regardless of the land use alternative selected. Therefore discussion is identical to subsection 5.2.2.9. No adverse impacts are anticipated associated with munitions.

## 5.2.3.10 Permits and Regulatory Authority

The use of the Alternative 1 LU & FP (CH) sites is not expected to alter the impacts as described for these regulatory issues in subsection 5.2.2.10. In this situation, the impacts on the operating permits and licenses are more closely related to what the training goal involves rather than the location of the permitted action. Construction permits are discussed under subsection 5.3 Step 2 -Support Facilities - Land Use and Construction Impact Analysis. The same operating permits/licenses as described in subsection 5.2.2.10 will be required regardless of the specific footprint of the support facility.

## 5.2.3.11 Biological Resources

This subsection examines the potential effects of the alternatives on the biological resources of the installation. As described in Section 3, there are three components of the proposed action. The following paragraphs identify and describe issues of concern in the impact analysis of the Training Methods Alternatives. The discussion has been divided into five subparts: Federal T & E Species; Other Protected Species; Wetlands; Aquatic Resources; and Terrestrial Resources. Only alternatives which present potential impacts are discussed, and no discussion of an alternative in a section means that no potential impacts associated with that alternative were identified. The issues identified in the analysis of Training Methods are listed in each subpart.

## 5.2.3.11.A Federal T & E Species

See subsection 5.2.2.11.A for a general discussion of T & E species.

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Federal T & E Species:

- Exposure to sound;
- Exposure to toxicological agents; and
- Exposure to human presence.

**5.2.3.11.A.1 Issue: *Exposure to Sound.*** The RCP, OPTM (Army's Proposed Action) and EPTM Alternatives include both implementation of training activities new to FLW, and the relocation of existing training ranges. Analyses indicate no direct or indirect effects to T & E species from exposure to sound resulting from Army's Proposed Land Use & Facility Alternative. See subsection 5.2.2.11.A.1 for discussion.

**5.2.3.11.A.2 Issue: *Exposure to Toxicological Agents.*** Effects of exposure to toxicological agents on T & E species under the Army's Proposed LU & FP (CH&I) are discussed in subsection 5.2.2.11.A.2. Effects related to the implementation of Alternative 1 LU & FP (CH) are similar to the impacts described for the Army's Proposed LU & FP (CH&I). Table 5.24 (Section 5.2.2.11.A.2) describes fog oil training locations for land use and facility plan alternatives. Tables 5.26 through 5.31 list Indiana bat hibernacula and gray bat maternity caves that may be affected by fog oil training under each training alternative. Tables 5.32 and 5.33 summarize, for each training alternative, locations and maximum distances at which fog oil may potentially affect bald eagles, Indiana bats, and gray bats.

**5.2.3.11.A.3 Issue: *Exposure to Human Presence.*** Implementation of BRAC-related training will require human activities at both new and relocated training locations. Effects of disturbance to T & E species from these activities were considered. Analyses indicate no direct or indirect effects to T & E species from human disturbance of the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives under any of the land Use/facility alternatives. See subsection 5.2.2.10.A.3 for discussion.

## 5.2.3.11.B Other Protected Species

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to OPS:

- Vehicle operations on training and maneuver areas;
- Release of unburned fuels from FFE deterrents training;
- Use of chemical simulants, radiological isotopes, and biological simulants; and
- Release of fog oil obscurant.

**5.2.3.11.B.1 Issue: *Vehicle Operations on Training and Maneuver Areas.*** A discussion of this issue can be found in subsection 5.2.2.11.B.1.

#### 5.2.3.11.B.1.1 RCP Alternative

- **Indirect Impacts.** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations to OPS under the RCP Alternative. See subsection 5.2.2.11.B.1. for a detailed discussion of the impacts associated with this alternative.

  Under the RCP Alternative, hasty decon training will involve washing vehicles to simulate field vehicle decontamination procedures. Antifreeze will be applied to the vehicle, and, using water from a permanent source such as a pond or creek, the antifreeze is washed off of the vehicles. By washing the vehicles in this manner, the antifreeze and other vehicle contaminants may degrade OPS habitat or enter installation surface waters, especially at the decon sites, and adversely affect aquatic species. The increased disturbance around surface waters may adversely affect migratory birds such as ducks, wading birds, and shorebirds. Under the Alternative 1 LU & FP (CH), hasty decon training will occur at the following sites: Penn's Pond (north); Penn's Pond (south); pond south of Training Area 243; pond at Training Area 238; pond in McCann Hollow; and Roubidoux Creek (south). Other Protected Species are more likely to be impacted by the Alternative 1 LU & FP (CH) than the Army's Proposed LU & FP (CH&I) because the aquatic species present in Roubidoux Creek, especially the state-listed freshwater mussels, are more sensitive to adverse water quality than aquatic species in ponds. All of the potential sites in the Army's Proposed LU & FP (CH&I) are in ponds.

#### 5.2.3.11.B.1.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts.** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations. See subsection 5.2.2.11.B.1.2 for a detailed discussion of the impacts associated with this alternative.

  Under the OPTM (Army's Proposed Action) and EPTM Alternative, hasty decon training will involve washing vehicles to simulate field vehicle decontamination procedures. However, instead of antifreeze being applied to the vehicle, polyethylene glycol (PEG 200), which is non-toxic, will be applied. By washing the vehicles in this manner, vehicle contaminants may enter installation surface waters and adversely affect OPS habitat. Possible adverse impacts from increased disturbance will also remain. However, since no antifreeze will be applied to the vehicle before washing, there will be less potential impacts to OPS habitat from the OPTM (Army's Proposed Action) and EPTM Alternative. Under the Army's Proposed LU & FP (CH&I), hasty decon training will occur at the same sites listed in the RCP Alternative. Other Protected Species are more likely to be impacted by the Alternative 1 LU & FP (CH) than the Army's Proposed LU & FP (CH&I), because the state-listed freshwater mussels present in Roubidoux Creek are sensitive to adverse water quality, and under the Army's Proposed LU & FP (CH&I), all hasty decon training will occur near ponds.

### 5.2.3.11.B.2 Issue: *Release of Unburned Fuels from FFE deterrents Training.*

There is a concern that FFE deterrents training will harm OPS by impacting air quality, destroying OPS habitat, contaminating surface waters. A discussion of the impacts associated with this issue can be found in subsection 5.2.2.11.B.2. Under the Alternative 1 LU & FP (CH) FFE deterrents training will occur on Range 27.

#### 5.2.3.11.B.2.1 RCP Alternative

- **Indirect Impacts** See subsection 5.2.2.11.B.2.1.

#### 5.2.3.11.B.2.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts** See subsection 5.2.2.11.B.2.2.

### 5.2.3.11.B.3 Issue: *Use of Chemical Simulants, Radiological Isotopes, and Biological Simulants.*

There is a concern that chemical simulants, radiological isotopes, and biological materials that simulate biological agents could cause adverse impacts to OPS. A discussion of this issue can be found in subsection 5.2.2.11.B.3.

#### 5.2.3.11.B.3.1 RCP Alternative

- **Indirect Impacts** See subsection 5.2.2.11.B.3.1.

#### 5.2.3.11.B.3.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts** See subsection 5.2.2.11.B.3.2.

### 5.2.3.11.B.4 Issue: *Release of Fog Oil Obscurant.*

There is a concern that fog oil may harm OPS during fog oil obscurant training. A description of the impacts associated with this issue can be found in subsection 5.2.2.11.B.4.

Under the Alternative 1 LU & FP (CH) obscurant operations will occur at Range 29 for static smoke training and Wolf Hollow, Babb Airfield, Ballard Hollow, and Musgrave Hollow for mobile and field smoke training.

#### 5.2.3.11.B.4.1 RCP Alternative

- **Direct Impacts** There is the potential for minor long-term direct adverse impacts to OPS as a result of fog oil obscurant training under the RCP Alternative. See subsection 5.2.2.11.B.4.1.

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to OPS under the RCP Alternative. See subsection 5.2.2.11.B.4.1.

#### 5.2.3.11.B.4.2 OPTM (Army's Proposed Action) Alternative

- **Direct Impacts** There may be minor long-term direct adverse impacts to OPS as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. See subsection 5.2.2.11.B.4.1.

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to OPS under the OPTM (Army's Proposed Action ) Alternative. See subsection 5.2.2.11.B.4.2.

#### 5.2.3.11.B.4.3 EPTM Alternative

- **Direct Impacts** There may be minor long-term direct adverse impacts to OPS as a result of fog oil obscurant training under the EPTM Alternative. The primary direct impacts are discussed in subsection 5.2.2.11.B.4.1.

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to OPS under the EPTM Alternative. See subsection 5.2.2.11.B.4.3.

## 5.2.3.11.C Wetlands

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to wetlands:

- Vehicle operations on training and maneuver areas; and
- Release of fog oil obscurant.

**5.2.3.11.C.1 Issue: *Vehicle Operations on Training and Maneuver Areas.*** Field maneuver training, vehicle operations, and operation of live fire ranges may contaminate soils, destroy vegetation, and degrade wetland habitat. See subsection 5.2.2.11.C.1 for a discussion of the TG and impacts associated with this issue.

**5.2.3.11.C.2 Issue: *Release of Fog Oil Obscurant.*** There is a concern that fog oil may degrade wetlands during fog oil obscurant training. See subsection 5.2.2.11.C.2 for a discussion of the TG and impacts to wetlands. Under the Alternative 1 LU & FP (CH) obscurant operations will occur at Range 29 for static smoke training and Wolf Hollow, Babb Airfield, Ballard Hollow, and Musgrave Hollow for mobile and field smoke training.

**5.2.3.11.C.2.1 RCP Alternative.** Under the RCP Alternative there will be a total of 125,500 gallons (476,9000 liters) of fog oil used during fog oil obscurant training.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to wetlands as a result of fog oil obscurant training under the RCP Alternative. Minor impacts are anticipated for wetland vegetation as described in subsection 5.2.2.11.C.2 and aquatic species as described in subsection 5.2.2.11.D.1.

**5.2.3.11.C.2.2 OPTM (Army's Proposed Action) Alternative.** Under the OPTM (Army's Proposed Action) Alternative there will be a total of 84,500 gallons (321,100 liters) of fog oil used during fog oil

obscurant training. Because of the reduced amount of fog oil utilized, there will be a lower potential for indirect adverse impacts to wetlands under the OPTM (Army's Proposed Action) Alternative than under the RCP Alternative.

- **Indirect Impacts.** There is a potential for negligible long-term indirect adverse impacts to wetlands as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. Minor impacts are anticipated for wetland vegetation as described in subsection 5.2.2.11.C.2 and aquatic species as described in subsection 5.2.2.11.D.1.

**5.2.3.11.C.2.3 EPTM Alternative.** Under the EPTM Alternative there will be a total of 49,500 gallons (188,100 liters) of fog oil released during fog oil obscurant training. Because of the reduced amount of fog oil utilized, there will be a lower potential for indirect adverse impacts to wetlands under the EPTM Alternative than under the OPTM (Army's Proposed Action) Alternative or RCP Alternative.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to wetlands as a result of fog oil obscurant training under the EPTM Alternative. Minor impacts are anticipated for wetland vegetation as described in subsection 5.2.2.11.C.2 and aquatic species as described in subsection 5.2.2.11.D.1.

## 5.2.3.11.D Aquatic Resources

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Aquatic Resources:

- Deposition of fog oil obscurant;
- Accidental fog oil spill;
- In-stream crossings or in-lake vehicle operations;
- Runoff from training and maneuver areas;
- Release of unburned fuels from FFE deterrents training;
- Maintenance training and operations.

**5.2.3.11.D.1 Issue: *Deposition of Fog Oil Obscurant.*** A discussion of this issue can be found in subsections 5.2.2.11.D.1 and 5.2.2.11.B.4. Under the Alternative 1 LU & FP (CH) obscurant operations will occur at Range 29 for static smoke training and Wolf Hollow, Babb Airfield, Ballard Hollow, and Musgrave Hollow for mobile and field smoke training.

#### 5.2.3.11.D.1.1 RCP Alternative

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to aquatic resources under the RCP Alternative. See subsection 5.2.2.11.D.1.1 for a discussion of impacts.

#### 5.2.3.11.D.1.2 OPTM (Army's Proposed Action) Alternative

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to aquatic resources under the OPTM (Army's Proposed Action) Alternative. See subsection 5.2.2.11.D.1.2 for a discussion of impacts.

#### 5.2.3.11.D.1.3 EPTM Alternative

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to aquatic resources under the EPTM Alternative. See subsection 5.2.2.11.D.1.3 for a discussion of impacts.

**5.2.3.11.D.2 Issue: *Accidental Fog Oil Spill.*** A discussion of this issue can be found in subsection 5.2.2.11.D.2.

#### 5.2.3.11.D.2.1 RCP Alternative

- **Indirect Impacts** There is potential for recurring short-term indirect adverse impacts to aquatic resources associated with the spill of fog oil. See subsection 5.2.2.11.D.2.1 for a discussion on this alternative and the location of fog oil storage sites.

#### 5.2.3.11.D.2.2 OPTM (Army's Proposed Action) Alternative

- **Indirect Impacts** There is a potential for recurring short-term indirect adverse impacts to aquatic resources associated with the spill of fog oil. See subsection 5.2.2.11.D.2.2 for a discussion on this alternative and the location of fog oil storage sites.

#### 5.2.3.11.D.2.3 EPTM Alternative

- **Indirect Impacts** There is a potential for recurring short-term indirect adverse impacts to aquatic resources associated with the spill of fog oil. See subsection 5.2.2.11.D.2.3 for a discussion on this alternative and the location of fog oil storage sites.

### 5.2.3.11.D.3 Issue: *In-stream Crossing or In-lake Vehicle Operations.* A discussion of this issue can be found in subsection 5.2.2.11.D.3.

#### 5.2.3.11.D.3.1 RCP, OPTM (Army's Proposed Action) and EPTM Alternative

- **Direct Impacts** In-stream vehicle crossings may cause direct long-term adverse impacts to aquatic species. The direct impacts to individual aquatic organisms will be short-term adverse, however, the effects on the aquatic species population will be long-term, because the direct impacts will be recurring due to the continuing training operation. See subsection 5.2.2.11.D.3.1 for a discussion of the impacts associated with this alternative.

- **Indirect Impacts** There may be indirect long-term adverse impacts to aquatic species during in-stream vehicle crossings. See subsection 5.2.2.11.D.3.1 for a discussion of the impacts associated with this alternative.

  Under the Alternative 1 LU & FP (CH), the FOX vehicle swim training will occur at Penn's Pond instead of Training Area 250 as described in the Army's Proposed LU & FP (CH&I). There is a greater potential for adverse impacts to aquatic resources with the Alternative 1 LU & FP (CH). Penn's Pond currently has a healthy fishery and provides many hours of recreational fishing annually.

### 5.2.3.11.D.4 Issue: *Runoff from Training and Maneuver Areas.* A discussion of this issue can be found in subsection 5.2.2.11.D.4.

#### 5.2.3.11.D.4.1 RCP Alternative

- **Indirect Impacts** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations. See subsection 5.2.2.11.D.4.1 for a discussion of the impacts associated with this alternative.

  Under the Alternative 1 LU & FP (CH), hasty decon training will occur at the following sites: Penn's Pond (north); Penn's Pond (south); pond south of Training Area 243; pond at Training Area 238; pond in McCann Hollow; and Roubidoux Creek (south). Aquatic resources are more likely to be impacted by the Alternative 1 LU & FP (CH) than the Army's Proposed LU & FP (CH&I), because the aquatic species present in Roubidoux Creek, especially the benthic macroinvertebrates and freshwater mussels, are more sensitive to adverse water quality than aquatic species in ponds, and all of the potential sites in the Army's Proposed LU & FP (CH&I) are in ponds.

#### 5.2.3.11.D.4.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations. See subsection 5.2.2.11.D.4.1 for a discussion of the impacts associated with this alternative.

  Aquatic resources are more likely to be impacted by the Alternative 1 LU & FP (CH) than the Army's Proposed LU & FP (CH&I), because the aquatic species present in Roubidoux Creek, especially the benthic macroinvertebrates and freshwater mussels, are more sensitive to adverse water quality than aquatic species in ponds, and all of the potential sites in the Army's Proposed LU & FP (CH&I) are in ponds.

### 5.2.3.11.D.5 Issue: *Release of Unburned Fuels from FFE deterrents Training.* A discussion of this issue can be found in subsection 5.2.2.11.D.5.

#### 5.2.3.11.D.5.1 RCP Alternative

- **Indirect Impacts** There is a potential for long-term indirect adverse impacts to aquatic species from the unburned fuels associated with FFE deterrents training. See subsection 5.2.2.11.D.5.1 for a discussion of the impacts associated with this alternative.

#### 5.2.3.11.D.5.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts** There is a potential for long-term indirect adverse impacts to aquatic species from the unburned fuels associated with FFE deterrents training. See subsection 5.2.2.11.D.5.2 for a discussion of the impacts associated with this alternative.

### 5.2.3.11.D.6 Issue: *Maintenance Training and Operations.* A discussion of this issue can be found in subsection 5.2.2.11.D.6.

#### 5.2.3.11.D.6.1 RCP Alternative

- **Indirect Impacts** There is the potential for long-term indirect adverse impacts from maintenance training and operation under the RCP Alternative. See subsection 5.2.2.11.D.6.1 for a discussion of the impacts associated with this alternative.

#### 5.2.3.11.D.6.2 OPTM (Army's Proposed Action) and EPTM Alternative

There will be no direct or indirect impacts to aquatic resources from maintenance training under the OPTM (Army's Proposed Action) and EPTM Alternative, because all maintenance training under these alternatives will be in a controlled environment.

## 5.2.3.11.E Terrestrial Resources

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to terrestrial resources:

- Vehicle operations on training and maneuver areas;
- Release of unburned fuels from FFE deterrents training; and
- Release of fog oil obscurant.

### 5.2.3.11.E.1 Issue: *Vehicle Operations on Training and Maneuver Areas.* See subsection 5.2.2.11.E.1 for a discussion of the TG and impacts associated with this issue.

#### 5.2.3.11.E.1.1 RCP Alternative

- **Direct Impacts.** There will be minor long-term direct adverse impacts to terrestrial resources from vehicles associated with training and maneuver operations under the RCP Alternative. The direct impacts will include destruction of vegetation, disturbance to wildlife, and possible mortality to wildlife species that have limited mobility. Since the overall range activities are expected to be similar to FY 1990 levels, the majority of the impacts should be consistent with past training activities, and no significant impacts are anticipated for the terrestrial species.

  See subsection 5.2.2.11.E.1.1. Under the Alternative 1 LU & FP (CH), hasty decon training will occur at the following sites: Penn's Pond (north); Penn's Pond (south); pond south of Training Area 243; pond at Training Area 238; pond in McCann Hollow; and Roubidoux Creek (south).

- **Indirect Impacts.** See subsection 5.2.2.11.E.1.1.

#### 5.2.3.11.E.1.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Direct Impacts.** There will be minor long-term direct adverse impacts to terrestrial resources from vehicles associated with training and maneuver operations under the OPTM (Army's Proposed Action) and EPTM Alternative. See subsection 5.2.2.11.E.1.2. Hasty decon training will occur at the same locations as listed in subsection 5.2.3.11.E.1.1.

### 5.2.3.11.E.2 Issue: *Release of Unburned Fuels from FFE deterrents Training.* FFE deterrents training activities are discussed in subsection 5.2.2.11.E.2.

**5.2.3.11.E.2.1 RCP Alternative.** As discussed in subsection 5.2.2.5.A.5.1, FFE deterrents training will use approximately 900 gallons (3,420 liters) of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 2,870 gallons (10,906 liters) of unburned fuel per year.

- **Direct Impacts.** There is a potential for long-term direct adverse impacts to terrestrial resources from the unburned fuels and noise associated with FFE deterrents training. See subsection 5.2.2.11.E.2.1.

- **Indirect Impacts.** There is a potential for long-term indirect adverse impacts to terrestrial resources from the unburned fuels, emissions, and noise associated with FFE deterrents training. See subsection 5.2.2.11.E.2.1 for a discussion of associated impacts.

**5.2.3.11.E.2.2 OPTM (Army's Proposed Action) and EPTM Alternative.** The OPTM (Army's Proposed Action) and EPTM Alternatives would result in smaller impacts than those associated with the RCP Alternative. The degree of the impacts would be lessened as a result of the smaller amount of fuel used (550 gallons (2,090 liters) per training cycle vs 900 gallons (3,420 liters) for the RCP Alternative). As discussed in subsection 5.2.2.5.A.5.2 FFE deterrents training will use approximately 550 gallons of thickened fuel in each of 41 training cycles per year and will result in the release of approximately 1,845 gallons (7,011 liters) of unburned fuel on the soil per year. In addition, modifications to the training area would be designed and constructed to collect unburned fuel and surface water runoff.

- **Direct Impacts.** There is a potential for long-term direct adverse impacts to terrestrial resources from the unburned fuels and noise associated with FFE deterrents training. See subsection 5.2.2.11.E.2.2.

- **Indirect Impacts.** There is a potential for long-term indirect adverse impacts to terrestrial resources from the unburned fuels, emissions, and noise associated with FFE deterrents training. See subsection 5.2.2.11.E.2.2 for a discussion of associated impacts.

**5.2.3.11.E.3 Issue: *Release of Fog Oil Obscurant.*** There is a concern that fog oil may harm terrestrial resources during fog oil obscurant training. See subsection 5.2.2.11.B.4 for a discussion of TG and impacts associated with this issue. Under Alternative 1 LU & FP (CH) obscurant operations will occur at Range 29 for static smoke training and Wolf Hollow, Babb Airfield, Ballard Hollow, and Musgrave Hollow for mobile and field smoke training.

**5.2.3.11.E.3.1 RCP Alternative.** Under the RCP Alternative there will be a total of 125,500 gallons (476,900 liters) of fog oil released during fog oil obscurant training as discussed in subsection 5.2.2.5.A.1.2.

- **Direct Impacts.** There may be minor long-term direct adverse impacts to terrestrial resources as a result of fog oil obscurant training under the RCP Alternative. See subsection 5.2.2.11.E.3.1.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to terrestrial resources as a result of fog oil obscurant training under the RCP Alternative. See subsection 5.2.2.11.E.3.1.

**5.2.3.11.E.3.2 OPTM (Army's Proposed Action) Alternative.** Under the OPTM (Army's Proposed Action) Alternative there will be a total of 84,500 gallons (321,100 liters) of fog oil released during fog oil obscurant training as discussed in subsection 5.2.2.5.A.1.2.

- **Direct Impacts.** There may be minor long-term direct adverse impacts to terrestrial resources as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. See subsection 5.2.2.11.E.3.2.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to terrestrial resources as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. See subsection 5.2.2.11.E.3.2.

**5.2.3.11.E.3.3 EPTM Alternative.** Under the EPTM Alternative there will be a total of 49,500 gallons (188,100 liters) of fog oil released during fog oil obscurant training as discussed in subsection 5.2.2.5.A.1.3.

- **Direct Impacts.** There may be minor long-term direct adverse impacts to terrestrial resources as a result of fog oil obscurant training under the EPTM Alternative. See subsection 5.2.2.11.E.3.3.

- **Indirect Impacts.** There is a potential for minor long-term indirect adverse impacts to terrestrial resources as a result of fog oil obscurant training under the EPTM Alternative. See subsection 5.2.2.11.E.3.3.

## 5.2.3.12 Cultural Resources

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Cultural Resources:

- Alteration of surface or buried archaeological sites; and
- Alteration of historic buildings or structures

**5.2.3.12.1 Issue: *Alteration of Surface or Buried Archaeological Sites.***
Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives at the Alternative 1 LU & FP (CH) locations will not have impacts different from those at the Army's Proposed LU & FP (CH&I). See the discussion in subsection 5.2.2.12.1.

**5.2.3.12.2 Issue: *Alteration of Historic Buildings or Structures.*** Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives at the Alternative 1 LU & FP (CH) locations will not have impacts different from those at the Army's Proposed LU & FP (CH&I). See the discussion in subsection 5.2.2.12.2.

## 5.2.3.13 Sociological Environment

The issues and impacts associated with the Alternative 1 LU & FP (CH) are the same as noted in subsection 5.2.2.13.

## 5.2.3.14 Economic Development

The issues and impacts associated with the Alternative 1 LU & FP (CH) are the same as noted in subsection 5.2.2.14.

## 5.2.3.15 Quality of Life

This subsection examines the potential effects of the alternatives on the quality of life of students, staff and/or members of the surrounding civilian community. As described in Section 3, there are three components of the proposed action. The following paragraphs identify and describe issues of concern in the impact analysis of the Training Methods alternatives as located in Alternative 1 LU & FP (CH). The discussion has been divided into two parts: general **Quality of Life** issues (subsection 5.2.3.15.A) and issues involving **Human Health and Safety** (subsection 5.2.3.15.B). Only alternatives which present potential impacts are discussed. No discussion of an alternative in a section means that no potential impacts associated with that alternative were identified.

Three issues were identified in the analysis of Training Goals. Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Quality of Life:

- Hunting and fishing access to field training areas;
- Ability of local medical facilities to handle radiological injuries; and
- Access to museums and associated materials.

## 5.2.3.15.A Quality of Life

**5.2.3.15.A.1 Issue: *Hunting and Fishing Access to Field Training Areas.*** No quantifiable difference in potential impacts resulting from TG 1.2 would be achieved if the training were to take place in a different area on FLW. Areas available for hunting and fishing, as described in subsection 5.2.2.15.A, are opened or closed on a daily basis depending on training or other mission requirements. Therefore, the discussion of impacts at subsection 5.2.2.15.A covers potential impacts which could result from this combination of training method alternative and land use/facility alternative.

**5.2.3.15.A.2 Issue: *Ability of Local Medical Facilities to Handle Radiological and Chemical Injuries.*** No difference in potential impacts resulting from TGs 6.1 and 6.4 would be achieved if the training were to take place in a different area on FLW. Therefore, the discussion of impacts at subsection 5.2.2.15.A covers potential impacts which could result from this combination of training method alternative and land use/facility alternative.

**5.2.3.15.A.3 Issue: *Access to Museums and Associated Materials.*** No difference in potential impacts resulting from TG 9.2 would be achieved if the training were to take place in a different area on FLW. Therefore, the discussion of impacts at subsection 5.2.2.15.A covers potential impacts which could result from this combination of training method alternative and land use/facility alternative.

## 5.2.3.15.B Human Health and Safety

A discussion of human health issues for the alternative methods of training and their alternatives to be transferred from FMC to FLW is at subsection 5.2.2.15.B. There will be no variance in the impacts to human health and safety as a result of implementation of training alternatives associated with the Alternative 1 LU & FP (CH) when compared to the Army's Proposed LU & FP (CH&I).

## 5.2.3.16 Installation Agreements

Implementation of the planned BRAC training objectives at FLW will result in the following issue with respect to Installation Agreements:

- Development of new agreements to accommodate relocated units.

Since this issue is associated with the relocation of personnel, it is discussed in subsection 5.4.2.16.

## 5.2.3.17 Operational Efficiency

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Operational Efficiency:

- the ability of the Army to accomplish its mission requirements through operationally efficient training methods; and
- the increased synergistic effects of training Chemical, Engineer, and Military Police specialists in one location.

The alternative training methods will have a similar effect on these three issues under each of the land use and facility plans. Discussion of these issues is located in subsection 5.2.2.17.

### 5.2.3.17.1 Issue: *Accomplish Mission Requirements Through Operationally Efficient Training Methods.*

The alternative training methods will have a similar effect on these three issues under each of the land use and facility plans. Discussion of these issues is located in subsection 5.2.2.17.

### 5.2.3.17.2 Issue: *Increased Synergistic Effects of Consolidated Training.*

Consolidation of Engineer, Chemical and Military Police training will result in numerous opportunities to improve the support provided by these specialties. Inter-speciality training in basic instruction, maneuver and wartime simulation, as well as other areas will allow the student to improve key communications skills prior to battlefield coordination. The potential for these positive synergistic effects will be greater under the Combined Headquarters and Instruction land use and facility plan as more activities are collocated.

Subsection 5.3.3.17 provides a review of the increased synergistic effects of consolidated training that might be anticipated if this land use plan were implemented, as these effects would be associated with: (1) the location at which the training would be accomplished and (2) the management organization of the schools providing the training. The subsection includes:

- an **Overview** of the goals that will be obtained through increasing the level of synergism at the schools and the formation of the Maneuver Support Command (MANSCEN);

- background information on the **Development and Initial Review of Alternative Land Use Plans**, followed by:

- the identification and development of the three land use and facility alternatives ((1) Combined Headquarters, (2) Separate Headquarters, and (3) Combined Headquarters and Instruction); and
- an introduction in a review related to operationally efficiency which was performed to identify the Land Use and Facility Plan for the Army's Proposed Action (including an introduction to the twelve criteria that were developed and used for this review); and

- an **Evaluation** of the operational concept for the consolidation of most of the non-teaching functions of the three schools and provides consolidated non-commissioned officer education systems.

## 5.2.3.18 Summary

Major differences between the anticipated impacts of implementing the training at the Alternative 1 LU & FP (CH), and the sites specified in the Army's Proposed LU & FP (CH&I) as discussed in subsection 5.2.2.18, are listed on Table 5.36. The most significant difference involves the use of Penn's Pond for FOX amphibious training. Although this aspect of FOX Training does not include the use of chemical simulants, the vehicles will be driven into and across the pond. This will increase the potential for sediment and POL products to enter the pond. In the Army's Proposed LU & FP (CH&I) this training would have been limited to Training Area 250, which includes a man-made amphibious training area. Consequently, implementation of any of the viable training methods (RCP, OPTM (Army's Proposed Action) or EPTM Alternative) under this land use and facility plan will have a greater potential for environmental impact when compared to the OPTM (Army's Proposed Action) Alternative.

## SUMMARY OF ATTRIBUTES - STEP 1, AT THE ALTERNATIVE 1 LAND USE AND FACILITY PLAN SITES (COMBINED HEADQ

**Table 5.36:**
**Summary of Attributes Associated with Implementing Alternative Training Methods at the Alternative 1 Land Use And Facilit**

| | Relocate Current Training Method (RCP) | Army's Propose Optimum Trainin |
|---|---|---|
| **Attribute** | **Attributes** | **Attril** |
| Land Use | See Table 5.29 | See Table 5.29 |
| Air Quality | See Table 5.29 | See Table 5.29 |
| Noise | See Table 5.29 | See Table 5.29 |
| Water Resources | **Negative:** Maneuver area training and in-lake training puts vehicles in Penn's Pond, a recreational lake used for fishing; adverse impacts to water quality associated with the washing off of grease, oils, and fuels. | Same as RCP |
| Geology and Soils | See Table 5.29 | See Table 5.29 |
| Infrastructure | **Negative:** Utility lines will have to be extended further to CDTF and Evasive Driving Course. | Same as RCP. |
| Munitions | See Table 5.29 | See Table 5.29 |
| Permits/Regulatory Authority | See Table 5.29 | See Table 5.29 |
| Biological Resources | | |
| a. T & E Species | See Table 5.29 | See Table 5.29 |
| b. OPS | **Negative**: Training involves In-stream crossings that puts vehicles in Roubidoux Creek with the potential for adverse impacts on state - listed mussels from grease, oils and fuels from the vehicles. | Same as RCP |
| c. Wetlands | See Table 5.29 | See Table 5.29 |
| d. Aquatic Resources | **Negative**: In-lake training puts vehicles in Penn's Pond , a recreational fishing lake, with the potential to have an adverse impact from grease, oils and fuels from the vehicles. | Same as RCP |
| e. Terrestrial Resource | See Table 5.29 | See Table 5.29 |
| Cultural Resources | See Table 5.29 | See Table 5.29 |
| Sociological Environment | See Table 5.29 | See Table 5.29 |
| Economic Development | See Table 5.29 | See Table 5.29 |
| Quality of Life | See Table 5.29; Training at Penn's Pond will impact recreation and fishing uses at the lake. | Same as RCP. |
| Human Health and Safety | See Table 5.29 | See Table 5.29 |

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| And Facility Plan Sites | |
|---|---|
| 's Proposed Training Action<br>um Training Method (OPTM) | Environmentally Preferred Training Method (EPTM) |
| Attributes | Attributes |
| | See Table 5.29 |
| | See Table 5.29 |
| | See Table 5.29 |
| | Same as RCP |
| | See Table 5.29 |
| | Same as RCP, except utility extension for the Evasive Driving Course will not be required. |
| | See Table 5.29 |
| | See Table 5.29 |
| | |
| | See Table 5.29 |
| | Same as RCP |
| | See Table 5.29 |
| | Same as RCP |
| | See Table 5.29 |
| | See Table 5.29 |
| | See Table 5.29 |
| | See Table 5.29 |
| | Same as RCP. |
| | See Table 5.29 |

**Table 5.36:**
**Summary of Attributes Associated with Implementing Alternative Training Methods at the Alternative 1 Land Use And Facil**

| | Relocate Current Training Method (RCP) | Army's Propos Optimum Train |
|---|---|---|
| **Attribute** | **Attributes** | **Att** |
| Installation Agreements | See Table 5.29 | See Table 5.29 |
| Operational Efficiency | **Positive:** Collocation of Chemical School and MP School headquarters with the Engineer School headquarters will provide coordination benefits and reduction of duplication in staff and activities. The amount of fog oil to be used would provide for longer training and best development of skills for three training goals (related to obscurant training) out of the 43 total training goals evaluated.<br>**Negative:** The headquarters will be separate from the school instruction facilities, thereby eliminating any benefits from collocation. When compared to the OPTM, 16 of the 43 training goals are noted to be less operationally preferred and six of the 43 would result in lower training effectiveness. | **Positive:** Collocation of Chemica with the Engineer School headqua and reduction of duplication in staf goals evaluated, 16 were identifie when compared to the RCP Altern effectiveness when compared to t EPTM, this alternative provides fo effective field training, therefore de trained soldiers.<br>**Negative:** The headquarters will facilities, thereby eliminating any b |

*Source: Harland Bartholomew & Associates, Inc.*

| And Facility Plan Sites | |
|---|---|
| 's Proposed Training Action<br>ıum Training Method (OPTM) | Environmentally Preferred Training Method (EPTM) |
| **Attributes** | **Attributes** |
| | See Table 5.29 |
| of Chemical School and MP School headquarters<br>ol headquarters will provide coordination benefits<br>tion in staff and activities. Of the 43 training<br>e identified as improving in operational efficiency<br>RCP Alternative and six would improve in training<br>pared to the EPTM. When compared to the<br>rovides for more realism resulting from more<br>herefore developing better skills and better<br><br>arters will be separate from the school instruction<br>ating any benefits from collocation. | **Positive:** Collocation of Chemical School and MP School headquarters with the Engineer School headquarters will provide coordination benefits and reduction of duplication in staff and activities.<br>**Negative:** The headquarters will be separate from the school instruction facilities, thereby eliminating any benefits from collocation. The training effectiveness would be lower in six training goal when compared to the RCP Alternative and six training goals when compared to the OPTM Alternative, including one critical key chemical school military occupational skill specialty, obscurant field training. |

# SUBSECTION 5.2.4

# Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.2.4 ANALYSIS OF TRAINING ALTERNATIVES IN ASSOCIATION WITH ALTERNATIVE 2 LAND USE AND FACILITY PLAN (Separate Headquarters)

### 5.2.4.1 Introduction

The following analysis identifies impact issues associated with implementation of the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives in association with facility locations as specified in Alternative 2 Land Use and Facility Plan (Separate Headquarters). Impact Matrix 3, located in Volume II, provides a graphic display of impacts described in this subsection. Where applicable, the impact discussions refer to information provided in subsection 5.2.2 to minimize duplication of the text.

A copy of Figure 5.1 has been reprinted on the backside of the divider sheet preceding this section to assist the reviewer in understanding the analysis. A modified version of Table 5.1 has also been provided below as Table 5.37 assist in this effort. The shaded column in Table 5.37 reflects the processes covered in this Analysis of Training Alternatives in Association with Alternative 2 Land Use and Facility Plan (Separate Headquarters).

Subsection 5.2.4.18 provides a summary of this analysis.

**Table 5.37:**
**Matrix Display of Step 1 (Subsections 5.2.2 through 5.2.4) Training Analysis Subsection Numbers**

| Subsection or Impact Analysis Categories | Subsection Numbers - Training Alternatives in Association with Army's Proposed LU & FP (CH&I) (Subsection 5.2.2) | Subsection Numbers - Training Alternatives in Association with Alternative 1 LU & FP (CH) (Subsection 5.2.3) | Subsection Numbers - Training Alternatives in Association with Alternative 2 LU & FP (SH) (Subsection 5.2.4) |
|---|---|---|---|
| Introduction | 5.2.2.1 | 5.2.3.1 | 5.2.4.1 |
| Land Use & Training Areas | 5.2.2.2 | 5.2.3.2 | 5.2.4.2 |
| Air Quality and Climate | 5.2.2.3 | 5.2.3.3 | 5.2.4.3 |
| Noise | 5.2.2.4 | 5.2.3.4 | 5.2.4.4 |
| Water Resources | 5.2.2.5 | 5.2.3.5 | 5.2.4.5 |
| Floodplains/Surface Water | 5.2.2.5.A | 5.2.3.5.A | 5.2.4.5.A |
| Hydrology/Groundwater | 5.2.2.5.B | 5.2.3.5.B | 5.2.4.5.B |
| Geology and Soils | 5.2.2.6 | 5.2.3.6 | 5.2.4.6 |
| Infrastructure | 5.2.2.7 | 5.2.3.7 | 5.2.4.7 |
| Hazardous/Toxic Materials | 5.2.2.8 | 5.2.3.8 | 5.2.4.8 |
| Munitions | 5.2.2.9 | 5.2.3.9 | 5.2.4.9 |
| Permits/Regulatory Authority | 5.2.2.10 | 5.2.3.10 | 5.2.4.10 |
| Biological Resources | 5.2.2.11 | 5.2.3.11 | 5.2.4.11 |
| Federal T & E Species | 5.2.2.11.A | 5.2.3.11.A | 5.2.4.11.A |
| Other Protected Species | 5.2.2.11.B | 5.2.3.11.B | 5.2.4.11.B |
| Wetlands | 5.2.2.11.C | 5.2.3.11.C | 5.2.4.11.C |
| Aquatic Resources | 5.2.2.11.D | 5.2.3.11.D | 5.2.4.11.D |
| Terrestrial Resources | 5.2.2.11.E | 5.2.3.11.E | 5.2.4.11.E |
| Cultural Resources | 5.2.2.12 | 5.2.3.12 | 5.2.4.12 |
| Sociological Environment | 5.2.2.13 | 5.2.3.13 | 5.2.4.13 |
| Economic Development | 5.2.2.14 | 5.2.3.14 | 5.2.4.14 |

| Table 5.37: Matrix Display of Step 1 (Subsections 5.2.2 through 5.2.4) Training Analysis Subsection Numbers | | | |
|---|---|---|---|
| **Subsection or Impact Analysis Categories** | **Subsection Numbers - Training Alternatives in Association with Army's Proposed LU & FP (CH&I) (Subsection 5.2.2)** | **Subsection Numbers - Training Alternatives in Association with Alternative 1 LU & FP (CH) (Subsection 5.2.3)** | **Subsection Numbers - Training Alternatives in Association with Alternative 2 LU & FP (SH) (Subsection 5.2.4)** |
| Quality of Life | 5.2.2.15 | 5.2.3.15 | 5.2.4.15 |
| Quality of Life | 5.2.2.15.A | 5.2.3.15.A | 5.2.4.15.A |
| Human Health and Safety | 5.2.2.15.B | 5.2.3.15.B | 5.2.4.15.B |
| Installation Agreements | 5.2.2.16 | 5.2.3.16 | 5.2.4.16 |
| Operational Efficiency | 5.2.2.17 | 5.2.3.17 | 5.2.4.17 |
| Summary | 5.2.2.18 | 5.2.3.18 | 5.2.4.18 |
| *Source: Harland Bartholomew & Associates, Inc.* | | | |

## 5.2.4.2 Land Use & Training Areas

Implementation of the planned BRAC training objectives at FLW will affect the following factors under this resource category:

- Reallocation of existing land use areas; and
- Establishment of a new buffer area surrounding the CDTF.

**5.2.4.2.1 Issue: *Reallocation of Existing Land Use Areas.*** As discussed in subsection 5.2.2.2, implementation of BRAC actions will result in the movement of training and mission related activities that were unforeseen during the development of the existing Master Plan/Land Use Plan for FLW (FLW, 1991c). These activities will increase the demand for both training and support facilities.

Implementation of any of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts. The existing Master Plan/Land Use Plan included areas for expansion within the established land use areas, these zones were sized based on potential changes in mission that were anticipated at the time the plan was developed. As the proposed BRAC action was not identified at the time of the Master Plan, the zones were not sized to accommodate the required activities and spatial requirements associated with the realigned missions being assigned to FLW.

- **Direct Impacts.** Implementation of Alternative 2 LU & FP (SH) will result in no change in the land use pattern for the non-cantonment training areas. However implementation of this plan will result in the following changes to the existing, approved land use plan (for approximately 216 acres) within the cantonment (built-up) area of the installation:

    - conversion of the existing Industrial and troop housing areas south of South Dakota Avenue and west of Iowa Avenue into administrative and training land uses (approximately 200 acres); and
    - conversion of a Troop Housing area along the western side of the 1000-area barracks to administrative use (approximately 16 acres).

    An illustration of these areas is provided on Figure 3.6, Alternative 2 LU & FP (SH) which is located in Section 3 of the EIS. Each of these land use changes within the cantonment is compatible with the existing land uses in the area and will have a beneficial impact based on the improved functional efficiency obtained by locating interrelated activities within the Military Police School and Chemical School in proximity to one another.

- **Indirect Impacts.** Implementation of this land use plan would isolate the Chemical School Library and Military Police School Library from the existing Engineer School Library and the Fort Leonard Wood Library. This would require duplication of many common volumes and eliminate the potential for joint use of support personnel.

#### 5.2.4.2.2 Issue: *Establishment of a New Buffer Area Surrounding the CDTF.*

Implementation of Alternative 2 LU & FP (SH), will change the location but not the extent of impacts associated with the establishment and operation of the CDTF. As discussed in subsection 5.2.2.2.2, no direct impacts on surrounding functions are anticipated. Indirect impacts would be as noted in subsection 5.2.2.2.2.

## 5.2.4.3 Air Quality and Climate

Implementation of the Alternative 1 LU & FP (CH) will alter the locations specified for training, but will result in significantly different direct or indirect impacts on air quality that are not already described in the Army's Proposed LU & FP (CH&I) discussed in subsection 5.2.2.3. It should be noted, that the air quality permit is location specific and any location changes would require FLW to pursue a permit modification.

## 5.2.4.4 Noise

Implementation of the planned BRAC training goals at FLW will result in the following issues with respect to Noise:

- Modification of Installation Compatible Use Zones (ICUZ);
- Mobile source (vehicular) noise; and
- Noise impacts on Biological Resources.

#### 5.2.4.4.1 Issue: *Modification of Installation Compatible Use Zones.*

Implementation of this land use alternative will have similar impacts to those discussed in subsection 5.2.2.4.1. As discussed in subsection 5.2.2.4.1, the impacts associated with the location of ranges activities vary between the land use alternatives and the type of ammunition used in Mark 19 training varies by training method implemented.

**5.2.4.4.1.1 RCP and OPTM (Army's Proposed Action) Alternatives.** Implementation of these training method alternatives will include the use of both high-explosive and modified training rounds for Mark 19 training. This training will occur at Range 19, as specified in subsection 5.2.2.4.1.1, consequently this alternative will have similar impacts. As discussed in Training Goal 10.1, the RCP and OPTM (Army's Proposed Action) Alternatives will involve the use of approximately 6 high-explosive and 24 modified training Mark 19 rounds by each U.S. Army student and 24 high-explosive Mark 19 rounds by each U.S. Marine Corps student. This ammunition will be in addition to the other types of ammunition used for various other weapons systems.

- **Direct Impacts.** As discussed in subsection 5.2.2.4.1.1, this training will include the use of both standard, high-explosive and modified training Mark 19 rounds. As part of this land use plan this training will occur at Range 19. The residences in Palace will be approximately 2 miles (3.2 kilometers) south of the Range 19 target area. The calculated C-weighted single exposure level (SEL) from a single explosion of high explosive 40 mm rounds used for Mark 19 training would be approximately 76 dB at approximately 1.8 miles (3 km). To find the cumulative noise impact from all of the explosions, one must average the total energy from all of the explosions in a year and average over a one year period. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM, 1996) calculated that the noise level at approximately 1.8 miles (3 km) would be only 37 dB, which is 25 decibels below the criterion for a Zone 2 noise area.

  Therefore, the implementation of the additional range training, including the Mark 19 training, as part of the this land use and facility plan will result in slight increases in the amount of noise

impacts experienced in the surrounding community. These additional impacts are not anticipated to significantly degrade the existing noise environment of the people occupying the closest sensitive land uses.

**5.2.4.4.1.2 EPTM Alternative.** As discussed in Training Goal 10.1, the EPTM Alternative will involve the use of approximately 30 modified training Mark 19 rounds by each U.S. Army student and 24 modified training Mark 19 rounds by each U.S. Marine Corps student. In addition, this training will include the use of the other ammunition and explosives listed on subsection 5.2.2.4.

- **Direct Impacts.** Implementation of this alternative will result in the use of at total of approximately 122,620 modified training rounds (Army Class B584) annually for Mark 19 training and no increase in the number of high-explosive rounds currently used at FLW as shown on Table 5.14. (located in subsection 5.2.2.4) In addition, this training will include the use of the other ammunition and explosives listed on Table 5.13 (located in subsection 5.2.2.4)

- **Indirect Impacts.** The use of only modified training rounds to support the training requirements of the Military Police School and Chemical School will reduce the level of noise associated with the impact and explosion of Mark 19 rounds. At 1.8 miles (3 km) the sound of firing modified training rounds (Army Class B584) will be inaudible (USACHPPM, 1996). Consequently, the implementation of the EPTM Alternative will reduce the amount of noise impact of this training on other on-post and off-post activities.

  Therefore, the implementation of the additional range training, including the Mark 19 training, as part of the EPTM at the range locations specified in the Alternative 2 LU & FP (SH) will result in slight increases in the amount of noise impacts experienced in the surrounding community. These additional impacts are not anticipated to significantly degrade the existing noise environment of the people occupying the closest sensitive land uses.

**5.2.4.4.2 Issue: *Mobile Source (Vehicular) Noise.*** Each of the training methods will generate similar increases in vehicle use and the resulting noise levels. Based upon the locations at which training activities are scheduled for implementation under this land use plan, vehicle noise will be concentrated in two locations: near the Engineer Headquarters and near the intersection on Iowa Avenue and South Dakota Avenue. These two locations will experience increased noise levels, but the increase in noise should not impact surrounding land uses.

**5.2.4.4.3 Issue: *Noise Impacts on Biological Resources.*** See subsection 5.2.2.4.3 for a discussion of this issue.

## 5.2.4.5 Water Resources

## 5.2.4.5.A Surface Water and Floodplains

The following issues were identified with the implementation of the planned BRAC training goals at FLW:

- Deposition of fog oil obscurant;
- Accidental spills of fog oil;
- Maintenance training and operations;
- Runoff from training and maneuver areas;
- Release of unburned fuels from FFE deterrents training; and
- In-stream crossings or in-lake vehicle operations.

**5.2.4.5.A.1 Issue: *Deposition of Fog Oil Obscurant.*** As discussed in subsections 5.2.2.5.A.1 and 5.2.2.11.B.4, concentrations of fog oil reaching surface waters through deposition and runoff would not create noticeable changes in water quality parameters. Obscurant training under the

Alternative 2 LU & FP (SH) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Babb Airfield (Smith Branch), Musgrave Hollow, McCann/Bailey Hollow, and Wolf Hollow. These drainage areas differ from the Army's Proposed LU & FP (CH&I) by conducting mobile training within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and Ballard Hollow. These drainage areas are all tributaries of Roubidoux Creek. Impacts to the drainage areas would remain as discussed in subsection 5.2.2.5.A.1.

**5.2.4.5.A.2 Issue: *Accidental Spills of Fog.*** As discussed within subsection 5.2.2.5.A.1, fog oil reaching surface waters would not create noticeable changes in water quality parameters. Obscurant training under the Alternative 2 LU & FP (SH) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Babb Airfield (Smith Branch), Musgrave Hollow, McCann/Bailey Hollow, and Wolf Hollow. These drainage areas differ from the Army's Proposed LU & FP (CH&I) by conducting mobile training within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and Ballard Hollow. Storage operations would remain in the same location as in the Army's Proposed LU & FP (CH&I). These drainage areas are all tributaries of Roubidoux Creek. Impacts to the drainage areas would remain as discussed in subsection 5.2.2.5.A.2.

**5.2.4.5.A.3 Issue: *Maintenance Training and Operations.*** Under Alternative 2 LU & FP (SH), maintenance training and operations would occur within the same locations as discussed in the Army's Proposed LU & FP (CH&I). Therefore, impacts to surface waters would remain as discussed in subsection 5.2.2.5.A.3.

**5.2.4.5.A.4 Issue: *Runoff From Training and Maneuver Areas.*** See subsection 5.2.2.5.A.4 for a discussion of this issue.

**5.2.4.5.A.4.1 RCP Alternative.** Training goals associated with the movement of personnel, vehicles and equipment (TGs 1.2, 1.8, 2.1, 3.1 and 10.1) would be located as discussed in subsection 5.2.2.5.A.4.1. A long-term indirect adverse impact would occur as discussed in subsection 5.2.2.5.A.4.1.

TG 6.2 NBC Equipment would occur at the following sites: Penn's Pond (north); pond south of TA 243; pond at TA 238; pond in McCann Hollow; Roubidoux Creek (south); and Roubidoux Creek (north). Impacts to surface waters will occur as discussed in subsection 5.2.2.5.A.4.1.

Obscurant training under the Alternative 2 LU & FP (SH) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Babb Airfield (Smith Branch), Musgrave Hollow, McCann/Bailey, and Wolf Hollow. These drainage areas differ from the Army's Proposed LU & FP (CH&I) by conducting mobile training within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and Ballard Hollow. These drainage areas are all tributaries of Roubidoux Creek. Impacts to the drainage areas would remain as discussed in subsection 5.2.2.5.A.4.1.

**5.2.4.5.A.4.2 OPTM (Army's Proposed Action) and EPTM Alternative.** Training goals associated with the movement of personnel, vehicles and equipment (TGs 1.2, 1.8, 2.1, 3.1 and 10.1) would be located as discussed in subsection 5.2.2.5.A.4.2. A long-term indirect adverse impact would occur as discussed in subsection 5.2.2.5.A.4.2.

As discussed in subsection 5.2.4.5.A.4.1, Mobile and Field Obscurant Employment Operations would be conducted within tributaries of Roubidoux Creek. Impacts would remain as discussed in subsection 5.2.2.5.A.4.2.

**5.2.4.5.A.5 Issue: *Release of Unburned Fuels from FFE deterrents Training.*** FFE deterrents training activities are discussed in subsection 5.2.2.5.A.5.1.

Alternative 2 LU & FP (SH) for TG 1.3 Mine and Obstacles Designed to Prevent Movement is located at Range 24 (McCann Hollow). As in the Army's Proposed LU & FP (CH&I), McCann Hollow is a tributary of Roubidoux Creek. Impacts to surface water would remain as discussed in subsection 5.2.2.5.A.5.

**5.2.4.5.A.6 Issue: *In-stream crossings or In-lake Vehicle Operations.*** See subsection 5.2.2.5.A.6 for a discussion of this issue.

This increase in sediment load may affect the aquatic resources within the stream or lake. A detailed discussion of the impacts to aquatic resources is given in subsection 5.2.4.11.D.

**5.2.4.5.A.6.1 RCP Alternative.** As in the Army's Proposed LU & FP (CH&I), field maneuver operations associated with TGs 1.2, 2.1 and 3.1 would be conducted within an available training range. Impacts to streams crossed would remain as discussed in subsection 5.2.2.5.A.6.1.

In-lake maneuver operations associated with the FOX Battlefield Employment under Alternative 2 LU & FP (SH) would be conducted within Bloodland Lake. Unlike TA 250 in the Army's Proposed LU & FP (CH&I), Bloodland Lake is used for recreational activities and is not currently designed for in-lake maneuver operations. Such operations could redistribute and increase the suspended solids in the lake. Contaminants (oils, grease or fluids) could wash off the vehicles directly into Bloodland Lake. As a result, a direct long-term adverse impact would occur.

Obscurant training under the Alternative 2 LU & FP (SH) would be conducted within the following drainage areas: Static - Bailey Hollow; Mobile and Field - Babb Airfield (Smith Branch), Musgrave Hollow, McCann/Bailey Hollow, and Wolf Hollow. These drainage areas differ from the Army's Proposed (LU & FP (CH&I) by conducting mobile training within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and Ballard Hollow. These drainage areas are all tributaries of Roubidoux Creek. Impacts to the drainage areas would remain as discussed in subsection 5.2.2.5.A.6.1.

**5.2.4.5.A.6.2 OPTM (Army's Proposed Action) and EPTM Alternative.** Impacts under the OPTM (Army's Proposed Action) and EPTM Alternative would occur as discussed in the RCP Alternative subsection 5.2.4.5.A.6.1. During obscurant operations (TG 7.3 and TG 7.4) the difference between the RCP Alternative and the OPTM (Army's Proposed Action) and EPTM Alternative is the quantity of fog oil being used. Since the quantity of fog oil used during training does not affect whether or not a stream is crossed, impacts would remain as discussed in subsection 5.2.4.5.A.6.1.

## 5.2.4.5.B Hydrogeology/Ground Water

This section examines the potential effects of the BRAC training objectives on the groundwater at the installation under the Alternative 2 LU & FP (SH). This section will only consider the differences of this land use plan relative to the Army's Proposed LU & FP (CH&I).

**5.2.4.5.B.1 Issue: *Off-road Vehicle Operations on Training and Maneuver Areas.*** The impacts associated with this issue are the same as those discussed in subsection 5.2.2.5.B.1 for the Army's Proposed LU & FP (CH&I).

**5.2.4.5.B.2 Issue: *Release of Unburned Fuels from FFE deterrents Training.*** Under the Alternative 2 LU & FP (SH), this training will be conducted at Range 24, which is south-southeast of the training site under the Army's Proposed LU & FP (CH&I). Impacts for this training activity will be similar to the impacts described for the Army's Proposed LU & FP (CH&I) in subsection 5.2.2.5.B.2.

**5.2.4.5.B.3 Issue: *Seismic Activity.*** Under the Alternative 2 LU & FP (SH), the CDTF will be constructed in the south-central portion of the base. Impacts from seismic activity would remain the same as was discussed for the Army's Proposed LU & FP (CH&I) in subsection 5.2.2.5.B.3.

**5.2.4.5.B.4 Issue: *Deposition of fog oil obscurant.*** This training would be conducted at different sites under the Alternative 2 LU & FP (SH) compared to the Army's Proposed LU & FP (CH&I). However, the site of the training will not alter the finding that fog oil will not likely accumulate in the soil. Therefore, the impacts will be the same as discussed in subsection 5.2.2.5.B.4.

**5.2.4.5.B.5 Issue: *Maintenance Training and Operations.*** Under the Alternative 2 LU & FP (SH), maintenance training and operations would occur within the same locations as discussed in the Army's Proposed LU & FP (CH&I). Therefore, impacts to ground water would remain as discussed in subsection 5.2.2.5.B.5.

## 5.2.4.6 Geology and Soils

This section examines the potential effects of the BRAC training objectives on the soil and geology at the installation under the Alternative 2 LU & FP (SH). This section will only consider the differences of this land use plan relative to the Army's Proposed LU & FP (CH&I).

**5.2.4.6.1 Issue: *Off-road Vehicle Operations on Training and Maneuver Areas.*** The impacts associated with this issue are the same as those discussed in subsection 5.2.2.6.1.

**5.2.4.6.2 Issue: *Release of Unburned Fuels from FFE deterrents Training.*** Under the Alternative 2 LU & FP (SH), this training goal will be conducted at Range 24, which is south-southeast of the training site under the Army's Proposed LU & FP (CH&I). The topography in the vicinity of this site is less steep than at Range 27. Therefore the potential for soil erosion is slightly lower, and the impacts will be similar to those discussed in subsection 5.2.2.6.2.

**5.2.4.6.3 Issue: *Seismic Activity.*** Under the Alternative 2 LU & FP (SH), the CDTF will be constructed in the south-central portion of the base. Impacts from seismic activity would remain the same as discussed in subsection 5.2.2.6.3.

**5.2.4.6.4 Issue: *Deposition of Fog Oil Obscurant.*** Obscurant training under the Alternative 2 LU & FP (SH) would be conducted within the following areas: Static - Bailey Hollow; Mobile and Field - near Babb Airfield, Musgrave Hollow, Wolf Hollow, and Bailey-McCann Hollows. These drainage areas differ from the Army's Proposed LU & FP (CH&I) by conducting mobile training near Babb Airfield and within Smith Branch and Wolf Hollow instead of at the Cannon Range (Mush Paddle Hollow) and McCann Hollow. Training at these locations would not produce an impact different from the Army's Proposed LU & FP (CH&I) discussed in subsection 5.2.2.6.4.

**5.2.4.6.5 Issue: *Maintenance Training and Operations.*** Under the Alternative 2 LU & FP (SH), maintenance training and operations would occur within the same locations as discussed in the Army's Proposed LU & FP (CH&I). Therefore, impacts to soils would remain as discussed in subsection 5.2.2.6.5.

## 5.2.4.7 Infrastructure

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Infrastructure:

- Adequacy of existing utility systems;
- Energy usage; and
- Adequacy of existing roadways.

**5.2.4.7.1 Issue: *Adequacy of Existing Utility Systems.*** As described in subsection 5.2.2.7.1, the capacities of the utility systems are adequate to service the anticipated increase in the effective population. Increases to the population at various locations throughout the installation may dictate the need for new or modified service connections to handle the increased demand. Most of these connections and modifications should not cause an adverse impact. Significant modifications and extension of services will be required for the CDTF and the Evasive Driving Area due to the remote site locations required by TG 6.3 Advanced NBC Decon Training and TG 11.2 Evasive Driving Training.

The general policy at FLW is that remote training areas are serviced with electricity only; water and wastewater services are provided by portable means. Due to the natural of training at the CDTF and the classroom requirement for Evasive Driving Training, water, wastewater, and natural gas services may be necessary at these facilities.

#### 5.2.4.7.1.1 RCP and OPTM (Army's Proposed Action) Alternative

- **Indirect Impact.** A potential long-term, adverse impact would occur with the need to extend additional utility lines to the CDTF and the Evasive Driving Training area. Under the Alternative 2 LU & FP (SH), the CDTF site is located approximately 8 miles (12.8 kilometers) south of the cantonment area and the Evasive Driving Training is located approximately 3.5 miles (5.6 kilometers) southwest of the cantonment area. Potable water, sewage, and natural gas do not currently service these areas. To connect the facilities to the installation's existing systems would require extending the existing utility lines from the cantonment areas. The creation of addition utility lines would increase the maintenance required by the utility service providers and would therefore result in a long-term adverse impact associated with the Advanced NBC Decon Training and Evasive Driving Training. A more detailed assessment of the utility needs and the associated construction requirements at these training areas are discussed in 5.3.4.7.

#### 5.2.4.7.1.2 EPTM Alternative

- **Direct Impact.** The impact of the EPTM Alternative for the Advanced NBC Decon Training is the same as described above in subsection 5.2.4.7.1.1. No natural gas, sewage, or water service would be provided to the Evasive Driving Training area under the EPTM Alternative. Therefore no adverse impact would be anticipated by the utilities required to service this training area.

**5.2.4.7.2 Issue: *Energy Usage.*** The increase in effective population and the increase in facilities at FLW will result in an increase in the energy consumption by the installation. The increased effective population associated with the BRAC action would be the same regardless of the land use alternative selected. Therefore, the impacts associated with this issue are the same as described in subsection 5.2.2.7.2.

**5.2.4.7.3 Issue: *Adequacy of Existing Roadways.*** Implementation of Alternative 2 LU & FP (SH) will disperse new facilities and training areas across the installation. The existing cantonment area roadway system will be adequate to support this land use plan. Implementation of the proposed training actions will also require the repair, expansion and modernization of several roads and road segments within the range and training areas. These repairs, expansions and modernizations will be accomplished as part of additional maintenance as a part of the Range Modifications (Project 46094) construction project.

- **Indirect Impact.** The repair, expansion and modernization of roads and road segments near the ranges ad training areas will result in improved (routine and emergency) access to these areas. All of the roads and road segments near the range and training areas are designed for restricted access and are not used by through traffic, consequently the utility of the improved access will be limited.

## 5.2.4.8 Hazardous Materials

Implementation of the proposed action will result in the following issues with respect to hazardous or toxic materials.

- Release of unburned fuels from FFE deterrents training;
- Maintenance training and operations;
- Increase in types and quantities of hazardous materials;
- Increase in types and quantities of radiological isotopes;

- Introduction of toxic agents; and
- Release of fog oil obscurant.

The same quantities and types of hazardous materials would be used regardless of the land use alternative selected. The location where the hazardous materials are to be used at FLW has the potential to create additional impacts to other environmental resource categories. The handling and disposal of hazardous wastes, special wastes, and medical wastes will follow the descriptions provided in subsection 5.2.2.8. Discussion of each issue and its anticipated impact is presented in subsection 5.2.2.8.

## 5.2.4.9 Munitions

The same quantities and types of munitions would be used regardless of the land use alternative selected. Therefore discussion is identical to subsection 5.2.2.9. No adverse impacts are anticipated associated with munitions.

## 5.2.4.10 Permits and Regulatory Authority

The use of the Alternative 2 LU & FP (SH) is not expected to alter the impacts as described for these regulatory issues in subsection 5.2.2.10. In this situation, the impacts on the operating permits and licenses are more closely related to what the training objective involves rather than the location of the permitted action. Construction permits are discussed under subsection 5.3 Step 2 -Support Facilities - Land Use and Construction Impact Analysis. The same operating permits/licenses as described in subsection 5.2.2.10 will be required regardless of the specific footprint of the support facility.

## 5.2.4.11 Biological Resources

This subsection examines the potential effects of the alternatives on the biological resources of the installation. As described in Section 3, there are three components of the proposed action. The following paragraphs identify and describe issues of concern in the impact analysis of the Training Goals Alternatives. The discussion has been divided into five subparts: Federal T & E Species; Other Protected Species; Wetlands; Aquatic Resources; and Terrestrial Resources. Only alternatives which present potential impacts are discussed, and no discussion of an alternative in a section means that no potential impacts associated with that alternative were identified. The issues identified in the analysis of Training Goals are listed in each subpart.

## 5.2.4.11.A Federal T & E Species

See subsection 5.2.2.11.A for a general discussion of T & E species.

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Federal T & E species:

- Exposure to sound;
- Exposure to toxicological agents; and
- Exposure to human presence.

**5.2.4.11.A.1 Issue: *Exposure to Sound.*** The RCP, OPTM (Army's Proposed Action) and EPTM Alternatives include both implementation of training activities new to FLW, and the relocation of existing training ranges. Analyses indicate no direct or indirect effects to T & E species from exposure to sound resulting from proposed BRAC action Land Use/Facilities Alternatives. See subsection 5.2.2.11.A.1 for discussion.

**5.2.4.11.A.2 Issue: *Exposure to Toxicological Agents.*** Effects of exposure to toxicological agents on T & E species under the Army's Proposed LU & FP (CH&I) are discussed in

subsection 5.2.2.11.A.2. Effects related to the implementation of Alternative 2 LU & FP (SH) are similar to those described for the Army's Proposed LU & FP (CH&I). Table 5.24 (Section 5.2.2.11.A.2) describes fog oil training locations for land use and facility plan alternatives. Tables 5.26 through 5.31 list Indiana bat hibernacula and gray bat maternity caves that may be affected by fog oil training under each training alternative. Tables 5.32 and 5.33 summarize, for each training alternative, locations and maximum distances at which fog oil may potentially affect bald eagles, Indiana bats, and gray bats.

**5.2.4.11.A.3 Issue: *Exposure to Human Presence.*** Implementation of BRAC-related training will require human activities at both new and relocated training locations. Effects of disturbance to T & E species from these activities were considered. Analyses indicate no direct or indirect effects to T & E species from human disturbance of the RCP, OPTM (Army's Proposed Action) and EPTM Alternatives under any of the Land Use and Facilities Alternatives. See subsection 5.2.2.11.A.3 for discussion.

## 5.2.4.11.B Other Protected Species

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to OPS:

- Vehicle operations on training and maneuver areas;
- Release of unburned fuels from FFE deterrents training;
- Use of chemical simulants, radiological isotopes, and biological simulants; and
- Release of fog oil obscurant.

**5.2.4.11.B.1 Issue: *Vehicle Operations on Training and Maneuver Areas.*** A discussion of this issue can be found in subsection 5.2.2.11.B.1.

#### 5.2.4.11.B.1.1 RCP Alternative

- **Indirect Impacts** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations to OPS under the RCP Alternative. See subsection 5.2.2.11.B.1 for a discussion of the impacts associated with this alternative.

  Under the Alternative 2 LU & FP (SH), hasty decon training will occur at the following sites: Penn's Pond (north); pond south of Training Area 243; pond at Training Area 238; pond in McCann Hollow; Roubidoux Creek (south); and Roubidoux Creek (north). Other Protected Species are more likely to be impacted by the Alternative 2 LU & FP (SH) than the Army Proposed LU & FP (CH&I), because the aquatic species present in Roubidoux Creek, especially the state-listed freshwater mussels, are more sensitive to adverse water quality than aquatic species in ponds. All of the potential sites in the Army Proposed LU & FP (CH&I) are near ponds.

#### 5.2.4.11.B.1.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations. See subsection 5.2.2.11.B.1 for a discussion of the impacts associated with this alternative.

  Under the Alternative 2 LU & FP (SH), hasty decon training will occur at the following sites: Penn's Pond (north); pond south of Training Area 243; pond at Training Area 238; pond in McCann Hollow; Roubidoux Creek (south); and Roubidoux Creek (north). OPS are more likely to be impacted by the Alternative 2 LU & FP (SH) than the Army Proposed LU & FP (CH&I), because the state-listed freshwater mussels present in Roubidoux Creek are sensitive to adverse water quality, and under the Army Proposed LU & FP (CH&I), all hasty decon training will occur near ponds.

### 5.2.4.11.B.2 Issue: *Release of Unburned Fuels from FFE deterrents Training.*

There is a concern that FFE deterrents training will harm OPS by impacting air quality, destroying OPS habitat, contaminating surface waters. A discussion of the impacts associated with this issue can be found in subsection 5.2.2.11.B.2. Under the Alternative 2 LU & FP (SH) FFE deterrents training will occur on Range 24.

#### 5.2.4.11.B.2.1 RCP Alternative

- **Indirect Impacts** See subsection 5.2.2.11.B.2.1 for a discussion of this issue.

#### 5.2.4.11.B.2.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts** See subsection 5.2.2.11.B.2.2. for a discussion of this issue.

### 5.2.4.11.B.3 Issue: *Use of Chemical Simulants, Radiological Isotopes, and Biological Simulants.*

There is a concern that chemical simulants, radiological isotopes, and biological materials that simulate biological agents could cause adverse impacts to OPS. A discussion of this issue can be found in subsection 5.2.2.11.B.3.

#### 5.2.4.11.B.3.1 RCP Alternative

- **Indirect Impacts** See subsection 5.2.2.11.B.3.1 for a discussion of this issue.

#### 5.2.4.11.B.3.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts** See subsection 5.2.2.11.B.3.2 for a discussion of this issue.

### 5.2.4.11.B.4 Issue: *Release of Fog Oil Obscurant.*

There is a concern that fog oil may harm OPS during fog oil obscurant training. A description of the impacts associated with this issue can be found in subsection 5.2.2.11.B.4. Under Alternative 2 LU & FP (SH) obscurant operations will occur at Range 24 for static smoke training and Wolf Hollow, Babb Airfield, Musgrave Hollow ; and Bailey/McCann Hollow for mobile and field smoke training.

#### 5.2.4.11.B.4.1 RCP Alternative

- **Direct Impacts** There may be minor long-term direct adverse impacts to OPS as a result of fog oil obscurant training under the RCP Alternative. See subsection 5.2.2.11.B.4.1.

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to OPS under the RCP Alternative. See subsection 5.2.2.11.B.4.1.

#### 5.2.4.11.B.4.2 OPTM (Army's Proposed Action) Alternative

- **Direct Impacts** There may be minor long-term direct adverse impacts to OPS as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. The primary direct impacts are discussed in subsection 5.2.2.11.B.4.1.

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to OPS under the OPTM (Army's Proposed Action) Alternative. See subsection 5.2.2.11.B.4.2.

#### 5.2.4.11.B.4.3 EPTM Alternative

- **Direct Impacts** There may be minor long-term direct adverse impacts to OPS as a result of fog oil obscurant training under the EPTM Alternative. The primary direct impacts are discussed in subsection 5.2.2.11.B.4.1.

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to OPS under the EPTM Alternative. See subsection 5.2.2.11.B.4.3.

## 5.2.4.11.C Wetlands

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to wetlands:

- Vehicle operations on training and maneuver areas; and
- Release of fog oil obscurant.

**5.2.4.11.C.1 Issue: *Vehicle Operations on Training and Maneuver Areas.*** Field maneuver training, vehicle operations, and operation of live fire ranges may contaminate soils, destroy vegetation, and degrade wetland habitat. See subsection 5.2.2.11.C.1 for a discussion of the TG and impacts associated with this issue.

**5.2.4.11.C.2 Issue: *Release of Fog Oil Obscurant.*** There is a concern that fog oil may degrade wetlands during fog oil obscurant training. See subsection 5.2.2.11.C.2 for a discussion of the TG and impacts to wetlands. Under Alternative 2 LU & FP (SH) obscurant operations will occur at Range 24 for static smoke training and Wolf Hollow, Babb Airfield, Musgrave Hollow , and Bailey/McCann Hollow for mobile and field smoke training.

**5.2.4.11.C.2.1 RCP Alternative.** Under the RCP Alternative there will be a total of 125,500 gallons (476,900 liters) of fog oil used during fog oil obscurant training. See subsection 5.2.2.5.A.1.1.

- **Indirect Impacts** There is a potential for minor long-term indirect adverse impacts to wetlands as a result of fog oil obscurant training under the RCP Alternative. Minor impacts are anticipated for wetland vegetation as described in subsection 5.2.2.11.C.2 and aquatic species as described in subsection 5.2.2.11.D.1.

**5.2.4.11.C.2.2 OPTM (Army's Proposed Action) Alternative.** Under the OPTM (Army's Proposed Action) Alternative there will be a total of 84,500 gallons of fog oil used during fog oil obscurant training. See subsection 5.2.3.11.C.2.2.

- **Indirect Impacts** There is a potential for negligible long-term indirect adverse impacts to wetlands as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. Minor impacts are anticipated for wetland vegetation as described in subsection 5.2.2.11.C.2 and aquatic species as described in subsection 5.2.2.11.D.1.

**5.2.4.11.C.2.3 EPTM Alternative.** Under the EPTM Alternative there will be a total of 49,500 gallons (188,100 liters) of fog oil released during fog oil obscurant training. Because of the reduced amount of fog oil utilized, there will be a lower potential for indirect impacts to wetlands under the EPTM Alternative than under the OPTM (Army's Proposed Action) or RCP Alternative

- **Indirect Impacts** There is a potential for minor long-term indirect adverse impacts to wetlands as a result of fog oil obscurant training under the EPTM Alternative. Minor impacts are anticipated for wetland vegetation as described in subsection 5.2.2.11.C.2 and aquatic species as described in subsection 5.2.2.11.D.1.

## 5.2.4.11.D Aquatic Resources

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Aquatic Resources:

- Deposition of fog oil obscurant;
- Accidental fog oil spill;
- In-stream crossings or in-lake vehicle operations;
- Runoff from training and maneuver areas;
- Release of unburned fuels from FFE deterrents training; and
- Maintenance training and operations.

**5.2.4.11.D.1 Issue: *Deposition of Fog Oil Obscurant.*** A discussion of this issue can be found in subsection 5.2.2.11.D.1 and 5.2.2.11.B.4. Under Alternative 2 LU & FP (SH) obscurant operations will occur at Range 24 for static smoke training and Wolf Hollow, Babb Airfield, Musgrave Hollow ; and Bailey/McCann Hollow for mobile and field smoke training.

#### 5.2.4.11.D.1.1 RCP Alternative

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to aquatic resources under the RCP Alternative. See subsection 5.2.2.11.D.1.1 for a discussion of this alternative.

#### 5.2.4.11.D.1.2 OPTM (Army's Proposed Action) Alternative

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to aquatic resources under the OPTM (Army's Proposed Action) Alternative. See subsection 5.2.2.11.D.1.2 for a discussion of this alternative.

#### 5.2.4.11.D.1.3 EPTM Alternative

- **Indirect Impacts** There will be a potential for minor long-term indirect adverse impacts to aquatic resources under the EPTM Alternative. See subsection 5.2.2.11.D.1.3 for a discussion of this alternative.

**5.2.4.11.D.2 Issue: *Accidental Fog Oil Spill.*** A discussion of this issue can be found in subsection 5.2.2.11.D.2.

#### 5.2.4.11.D.2.1 RCP Alternative

- **Indirect Impacts** There is a potential for recurring short-term indirect adverse impacts to aquatic resources associated with spills of fog oil. See subsection 5.2.2.11.D.2.1 for a discussion on this alternative and the location of fog oil storage sites.

#### 5.2.4.11.D.2.2 OPTM (Army's Proposed Action) Alternative

- **Indirect Impacts** There is a potential for recurring short-term indirect adverse impacts to aquatic resources associated with spills of fog oil. See subsection 5.2.2.11.D.2.2 for a discussion on this alternative and the location of fog oil storage sites.

#### 5.2.4.11.D.2.3 EPTM Alternative

- **Indirect Impacts** There is a potential for recurring short-term indirect adverse impacts to aquatic resources associated with spills of fog oil. See subsection 5.2.2.11.D.2.3 for a discussion on this alternative and the location of fog oil storage sites.

### 5.2.4.11.D.3 Issue: *In-stream Crossings or In-Lake Vehicle Operations.* A discussion of this issue can be found in subsection 5.2.2.11.D.3.

Implementation of the three action (RCP, OPTM (Army's Proposed Action) and EPTM) alternatives will have similar impacts.

- **Direct Impacts** In-stream vehicle crossings may cause direct long-term adverse impacts to aquatic species. The direct impacts to individual aquatic organisms will be short-term adverse, however, the effects on the aquatic species population will be long-term, because the direct impacts will be recurring due to the continuing training operation. See subsection 5.2.2.11.D.3.1 for a discussion of the impacts associated with these alternatives.

- **Indirect Impacts** There may be indirect long-term adverse impacts to aquatic species during in-stream vehicle crossings. See subsection 5.2.2.11.D.3.1 for a discussion of the impacts associated with this alternative.

  Under the Alternative 2 LU & FP (SH), the FOX vehicle swim training will occur at Bloodland Lake instead of Training Area 250 as described in the Army's Proposed LU & FP (CH&I), and there is a greater potential for adverse impacts to aquatic resources with the Alternative 2 LU & FP (SH). Bloodland Lake currently has a healthy fishery and provides many hours of recreational fishing annually. Bloodland Lake is the most important reservoir fishery on FLW, and any impacts to this aquatic habitat would be considered adverse.

### 5.2.4.11.D.4 Issue: *Runoff from Training and Maneuver Areas.* A discussion of this issue can be found in subsection 5.2.2.11.D.4.

#### 5.2.4.11.D.4.1 RCP Alternative

- **Indirect Impacts** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations. See subsection 5.2.2.11.D.4.1 for a discussion of the impacts associated with this alternative.

  Under the Alternative 2 LU & FP (SH), hasty decon training will occur at the following sites: Penn's Pond (north); pond south of Training Area 243; pond at Training Area 238; pond in McCann Hollow; Roubidoux Creek (south); and Roubidoux Creek (north). Aquatic resources are more likely to be impacted by the Alternative 2 LU & FP (SH) than the Army's Proposed LU & FP (CH&I), because the aquatic species present in Roubidoux Creek, especially the benthic macroinvertebrates and freshwater mussels, are more sensitive to adverse water quality than aquatic species in ponds. All of the potential sites in the Army's Proposed LU & FP (CH&I) are in ponds.

#### 5.2.4.11.D.4.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts** There will be long-term indirect adverse impacts from runoff associated with training and maneuver operations. See subsection 5.2.2.11.D.4.1 for a discussion of the impacts associated with these alternatives.

  Under the Alternative 2 LU & FP (SH), hasty decon training will occur at the following sites: Penn's Pond (north); pond south of Training Area 243; pond at Training Area 238; pond in McCann Hollow; Roubidoux Creek (south); and Roubidoux Creek (north). Aquatic resources are more likely to be impacted by the Alternative 2 LU & FP (SH) than the Army's Proposed LU & FP (CH&I), because the aquatic species present in Roubidoux Creek, especially the benthic macroinvertebrates and freshwater mussels, are more sensitive to adverse water quality than aquatic species in ponds. All of the potential sites in the Army's Proposed LU & FP (CH&I) are in ponds.

### 5.2.4.11.D.5 Issue: *Release of Unburned Fuels from FFE deterrents Training.* A discussion of this issue can be found in subsection 5.2.2.11.D.5.

#### 5.2.4.11.D.5.1 RCP Alternative

- **Indirect Impacts** There is a potential for long-term indirect adverse impacts to aquatic species from the unburned fuels associated with FFE deterrents training. See subsection 5.2.2.11.D.5.1 for a discussion of the impacts associated with this alternative.

#### 5.2.4.11.D.5.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Indirect Impacts** There is a potential for long-term indirect adverse impacts to aquatic species from the unburned fuels associated with FFE deterrents training. See subsection 5.2.2.11.D.5.2 for a discussion of the impacts associated with this alternative.

### 5.2.4.11.D.6 Issue: M*aintenance Training and Operations.* A discussion of this issue can be found in subsection 5.2.2.11.D.6.

#### 5.2.4.11.D.6.1 RCP Alternative

- **Indirect Impacts** There is the potential for long-term indirect adverse impacts from maintenance training and operation under the RCP Alternative. See subsection 5.2.2.11.D.6.1 for a discussion of the impacts associated with this alternative.

**5.2.4.11.D.6.2 OPTM (Army's Proposed Action) and EPTM Alternative.** There will be no direct or indirect impacts to aquatic resources from maintenance training under the OPTM (Army's Proposed Action) and EPTM Alternative, because all maintenance training under these alternatives will be in a controlled environment.

## 5.2.4.11.E Terrestrial Resources

Implementation of the planned BRAC training goals at FLW will result in the following issues with respect to terrestrial resources:

- Vehicle operations on training and maneuver areas;
- Release of unburned fuels from FFE deterrents training; and
- Release of fog oil obscurant.

### 5.2.4.11.E.1 Issue: *Vehicle Operations on Training and Maneuver Areas.* A discussion of the TG possible impacts associated with this issue can be found in subsection 5.2.2.11.E.1.

#### 5.2.4.11.E.1.1 RCP Alternative

- **Direct Impacts** There will be minor long-term direct adverse impacts to terrestrial resources from vehicles associated with training and maneuver operations under the RCP Alternative. The direct impacts will include destruction of vegetation, disturbance to wildlife, and possible mortality to wildlife species that have limited mobility. Since the overall range activities are expected to be similar to FY 1990 levels, the majority of the impacts should be consistent with past training activities, and no significant impacts are anticipated for the terrestrial species. See subsection 5.2.2.11.E.1.1.

  Under the Alternative 2 LU & FP (SH), hasty decon training will occur at the following sites: Penn's Pond (north); pond south of Training Area 243; pond at Training Area 238; pond in McCann Hollow; Roubidoux Creek (south); and Roubidoux Creek (north).

- **Indirect Impacts** See subsection 5.2.2.11.E.1.1.

#### 5.2.4.11.E.1.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Direct Impacts** There will be minor long-term direct adverse impacts to terrestrial resources from vehicles associated with training and maneuver operations under the OPTM (Army's Proposed Action) and EPTM Alternative. See subsection 5.2.2.11.E.1.1 and 5.2.2.11.E.2.

  Hasty decon training will occur at the same locations as listed in subsection 5.2.4.11.E.1.1 and 5.2.2.11.E.2.

### 5.2.4.11.E.2 Issue: *Release of Unburned Fuels from FFE deterrents Training.*

There is a concern that the unburned fuels remaining after FFE deterrents training will harm terrestrial resources by impacting air quality, degrading vegetation, destroying resident species habitat, and contaminating surface waters. See subsection 5.2.2.11.E.2 for a discussion of the TG and impacts associated with this issue.

Under the Alternative 2 LU & FP (SH) all FFE deterrents training will occur on Range 24.

#### 5.2.4.11.E.2.1 RCP Alternative

- **Direct Impacts** There is a potential for long-term direct adverse impacts to terrestrial resources from the unburned fuels and noise associated with FFE deterrents training. See subsection 5.2.2.11.E.2.1.

- **Indirect Impacts** There is a potential for long-term indirect adverse impacts to terrestrial resources from the unburned fuels, emissions, and noise associated with FFE deterrents training.

#### 5.2.4.11.E.2.2 OPTM (Army's Proposed Action) and EPTM Alternative

- **Direct Impacts** There is a potential for long-term direct adverse impacts to terrestrial resources from the unburned fuels and noise associated with FFE deterrents training. See subsection 5.2.2.11.E.2.2.

- **Indirect Impacts** There is a potential for long-term indirect adverse impacts to terrestrial resources from the unburned fuels, emissions, and noise associated with FFE deterrents training.

### 5.2.4.11.E.3 Issue: *Release of Fog Oil Obscurant.*

There is a concern that fog oil may harm terrestrial resources during fog oil obscurant training. See subsection 5.2.2.11.E.4 for a discussion of TG and impacts associated with this issue. Under Alternative 2 LU & FP (SH) obscurant operations will occur at Range 24 for static smoke training and Wolf Hollow, Babb Airfield, Musgrave Hollow; and Bailey/McCann Hollow for mobile and field smoke training.

**5.2.4.11.E.3.1 RCP Alternative.** Under the RCP Alternative there will be a total of 125,500 gallons of fog oil used during fog oil obscurant training.

- **Direct Impacts** There may be minor long-term direct adverse impacts to terrestrial resources as a result of fog oil obscurant training under the RCP Alternative. See subsection 5.2.2.11.E.3.1.

- **Indirect Impacts** There is a potential for minor long-term indirect adverse impacts to terrestrial resources as a result of fog oil obscurant training under the RCP Alternative. See subsection 5.2.2.11.E.3.1.

**5.2.4.11.E.3.2 OPTM (Army's Proposed Action) Alternative.** Under the OPTM (Army's Proposed Action) Alternative there will be a total of 84,500 gallons (321,100 liters) of fog oil used during fog oil obscurant training.

- **Direct Impacts** There may be minor long-term direct adverse impacts to terrestrial resources as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. See subsection 5.2.2.11.E.3.2.

- **Indirect Impacts** There is a potential for minor long-term indirect adverse impacts to terrestrial resources as a result of fog oil obscurant training under the OPTM (Army's Proposed Action) Alternative. See subsection 5.2.2.11.E.3.2.

**5.2.4.11.E.3.3 EPTM Alternative.** Under the EPTM Alternative there will be a total of 49,500 gallons (188,100 liters) of fog oil used during fog oil obscurant training.

- **Direct Impacts** There may be minor long-term direct adverse impacts to terrestrial resources as a result of fog oil obscurant training under the EPTM Alternative. See subsection 5.2.2.11.E.3.3.

- **Indirect Impacts** There is a potential for minor long-term indirect adverse impacts to terrestrial resources as a result of fog oil obscurant training under the EPTM Alternative. See subsection 5.2.2.11.E.3.3.

## 5.2.4.12 Cultural Resources

Implementation of the planned BRAC training goals at FLW will result in the following issues with respect to Cultural Resources:

- Alteration of surface or buried archaeological sites; and
- Alteration of historic buildings or structures.

### 5.2.4.12.1 Issue: *Alteration of Surface or Buried Archaeological Sites.*

Implementation of any of the three action alternatives at the Alternative 2 LU & FP (SH) locations will not have impacts different from those at the Army's Proposed LU & FP (CH&I). See the discussion in subsection 5.2.2.12.1.

**5.2.4.12.2 Issue: *Alteration of Historic Buildings or Structures.*** Implementation of any of the three action alternatives at the Alternative 2 LU & FP (SH) locations will not have impacts different from those at the Army's Proposed LU & FP (CH&I). See the discussion in subsection 5.2.2.12.

## 5.2.4.13 Sociological Environment

The issues and impacts associated with the Alternative 2 LU & FP (SH) are the same as noted in subsection 5.2.2.13 OPTM (Army's Proposed Action) Alternative.

## 5.2.4.14 Economic Development

The issues and impacts associated with the Alternative 2 LU & FP (SH) are the same as noted in subsection 5.2.2.14 OPTM (Army's Proposed Action) Alternative.

## 5.2.4.15 Quality of Life

## 5.2.4.15.A Quality of Life

This subsection examines the potential effects of the alternatives on the quality of life of students, staff and/or members of the surrounding civilian community. As described in Section 3, there are three components of the proposed action. The following paragraphs identify and describe issues of concern in the impact analysis of the Training Goals alternatives as located in Alternative 2 LU & FP (SH). The discussion has been divided into two parts: general Quality of Life issues (subsection 5.2.4.15.A) and issues involving Human Health and Safety (subsection 5.2.4.15.B). Only alternatives which present potential impacts are discussed. No discussion of an alternative in a section means that no potential impacts associated with that alternative were identified.

Four issues were identified in the analysis of Training Goals. Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Quality of Life:

- Hunting and fishing access to field training areas;
- Ability of local medical facilities to handle radiological injuries; and
- Access to museums and associated materials.

**5.2.4.15.A.1 Issue: *Hunting and Fishing Access to Field Training Areas.*** No quantifiable difference in potential impacts resulting from TG 1.2 would be achieved if the training were to take place in a different area on FLW. Areas available for hunting and fishing, as described in subsection 5.2.2.15.A, are opened or closed on a daily basis depending on training or other mission requirements. Therefore, the discussion of impacts at subsection 5.2.2.15.A covers potential impacts which could result from this combination of training goal alternative and land use/facility alternative.

**5.2.4.15.A.2 Issue: *Ability of Local Medical Facilities to Handle Radiological and Chemical Injuries.*** No difference in potential impacts resulting from TGs 6.1 and 6.4 would be achieved if the training were to take place in a different area on FLW. Therefore, the discussion of impacts at subsection 5.2.2.15.A covers potential impacts which could result from this combination of training goal alternative and land use/facility alternative.

**5.2.4.15.A.3 Issue: *Access to Museums and Associated Materials.*** No difference in potential impacts resulting from TG 9.2 would be achieved if the training were to take place in a different area on FLW. Therefore, the discussion of impacts at subsection 5.2.2.15.A covers potential impacts which could result from this combination of training goal alternative and land use/facility alternative.

## 5.2.4.15.B Human Health and Safety

A discussion of human health issues for the different types of training and their alternatives to be transferred from FMC to FLW is at subsection 5.2.2.15.B. There will be no variance in the impacts to human health and safety as a result of implementation of training alternatives associated with the Alternative 2 LU & FP (SH) when compared to the Army's Proposed LU & FP (CH&I).

## 5.2.4.16 Installation Agreements

Implementation of the planned BRAC training objectives at FLW will result in the following issue with respect to Installation Agreements:

- Development of new agreements to accommodate relocated units.

Since this issue is associated with the relocation of personnel, it is discussed in subsection 5.4.2.16.

## 5.2.4.17 Operational Efficiency

Implementation of the planned BRAC training objectives at FLW will result in the following issues with respect to Operational Efficiency:

- the ability of the Army to accomplish its mission requirements through operationally efficient training methods; and
- the increased synergistic effects of training Chemical, Engineer, and Military Police specialists in one location.

The alternative training methods will have a similar effect on these three issues under each of the land use and facility plans. Discussion of these issues is located in subsection 5.2.2.17.

### 5.2.4.17.1 Issue: *Accomplish Mission Requirements Through Operationally Efficient Training Methods.*

The alternative training methods will have a similar effect on these three issues under each of the land use and facility plans. Discussion of these issues is located in subsection 5.2.2.17.

### 5.2.4.17.2 Issue: *Increased Synergistic Effects of Consolidated Training.*

Consolidation of Engineer, Chemical and Military Police training will result in numerous opportunities to improve the support provided by these specialties. Inter-speciality training in basic instruction, maneuver and wartime simulation, as well as other areas will allow the student to improve key communications skills prior to battlefield coordination. The potential for these positive synergistic effects will be greater under the Combined Headquarters and Instruction land use and facility plan as more activities are collocated.

Subsection 5.3.3.17 provides a review of the increased synergistic effects of consolidated training that might be anticipated if this land use plan were implemented, as these effects would be associated with: (1) the location at which the training would be accomplished and (2) the management organization of the schools providing the training. The subsection includes:

- an **Overview** of the goals that will be obtained through increasing the level of synergism at the schools and the formation of the Maneuver Support Command (MANSCEN);

- background information on the **Development and Initial Review of Alternative Land Use Plans**, followed by:

    - the identification and development of the three land use and facility alternatives ((1) Combined Headquarters, (2) Separate Headquarters, and (3) Combined Headquarters and Instruction); and
    - an introduction in a review related to operationally efficiency which was performed to identify the Land Use and Facility Plan for the Army's Proposed Action (including an introduction to the twelve criteria that were developed and used for this review); and

- an **Evaluation** of the operational concept for the consolidation of most of the non-teaching functions of the three schools and provides consolidated non-commissioned officer education systems.

## 5.2.4.18 Summary

Major differences between the anticipated impacts of implementing the training at the Alternative 2 LU & FP (SH) sites, and the sites specified in the Army's Proposed LU & FP (CH&I) as discussed in subsection 5.2.2.18, are listed on Table 5.38. The most significant difference involves the use of Bloodland Lake for FOX amphibious training. Although this aspect of FOX Training does not include the use of chemical

simulants, the vehicles will be driven into and across the pond. This will increase the potential for sediment and POL products to enter the pond. In the Army's Proposed LU & FP (CH&I) this training would have been limited to Training Area 250, which includes a man-made amphibious training area. Consequently, implementation of any of the viable training goals (RCP, OPTM (Army's Proposed Action) or EPTM Alternatives) under the Alternative 2 LU & FP (SH) will have a greater potential for environmental impact when compared to the OPTM (Army's Proposed Action) Alternative.

SUMMARY OF ATTRIBUTES - STEP 1, AT THE ALTERNATIVE 2 LAND USE AND FACILITY PLAN SITES (SEPARATE HEADQ

**Table 5.38:**
**Summary of Attributes Associated with Implementing Alternative Training Methods at the Alternative 2 Land Use and Facilit**

| | Relocate Current Training Method (RCP) | Army's Propos<br>Optimum Traini |
|---|---|---|
| **Attribute** | **Attributes** | **Att** |
| Land Use | See Table 5.29 | See Table 5.29 |
| Air Quality | See Table 5.29 | See Table 5.29 |
| Noise | See Table 5.29 | See Table 5.29 |
| Water Resources | **Negative:** Maneuver area training and in-lake training puts vehicles in Bloodland Lake, a recreational lake used for fishing; adverse impacts to water quality associated with the washing off of grease, oils, and fuels. | Same as RCP |
| Geology and Soils | See Table 5.29 | See Table 5.29 |
| Infrastructure | **Negative**: Utility extension needed for CDTF and Evasive Driving. | Same as RCP. |
| Munitions | See Table 5.29 | See Table 5.29 |
| Permits/Regulatory Authority | See Table 5.29 | See Table 5.29 |
| Biological Resources | | |
| a. T & E Species | See Table 5.29. | See Table 5.29 |
| b. OPS | **Negative**: In-stream training puts vehicles in Roubidoux Creek with the potential to have an adverse impact on state - listed mussels from grease, oils and fuels from the vehicles. | See Table 5.29 |
| c. Wetlands | See Table 5.29 | See Table 5.29 |
| d. Aquatic Resources | **Negative**: In-lake training puts vehicles in Bloodland Lake , a recreational fishing lake, with the potential to have an adverse impact to aquatic life from grease, oils and fuels from the vehicles. | See RCP |
| e. Terrestrial Resource | See Table 5.29 | See Table 5.29 |
| Cultural Resources | See Table 5.29 | See Table 5.29 |
| Sociological Environment | See Table 5.29 | See Table 5.29 |
| Economic Development | See Table 5.29 | See Table 5.29 |
| Quality of Life | **Negative**: In-lake training at Bloodland Lake will disrupt recreation and fishing activities; See Table 5.29. | Same as RCP. |
| Human Health and Safety | See Table 5.29 | See Table 5.29 |
| Installation Agreements | See Table 5.29 | See Table 5.29 |

| and Facility Plan Sites | |
|---|---|
| y's Proposed Training Action num Training Method (OPTM) | Environmentally Preferred Training Method (EPTM) |
| Attributes | Attributes |
| | See Table 5.29 |
| | See Table 5.29 |
| | See Table 5.29 |
| | Same as RCP |
| | See Table 5.29 |
| | Same as RCP. |
| | See Table 5.29 |
| | See Table 5.29 |
| | |
| | See Table 5.29 |
| | See Table 5.29 |
| | See Table 5.29 |
| | See RCP |
| | See Table 5.29 |
| | See Table 5.29 |
| | See Table 5.29 |
| | See Table 5.29 |
| | Same as RCP. |
| | See Table 5.29 |
| | See Table 5.29 |

**Table 5.38:**
**Summary of Attributes Associated with Implementing Alternative Training Methods at the Alternative 2 Land Use and Facili**

| | Relocate Current Training Method (RCP) | Army's Propos Optimum Train |
|---|---|---|
| **Attribute** | **Attributes** | **Att** |
| Operational Efficiency | **Positive**: Maintain separate school identity. The amount of fog oil to be used would provide for longer training and best development of skills for three training goals (related to obscurant training) out of the 43 total training goals evaluated.<br>**Negative**: Physical separation of headquarters, instruction facilities and housing would reduce any synergism among the three schools and require duplication of staff and services. When compared to the OPTM, 16 of the 43 training goals are noted to be less operationally preferred and six of the 43 would result in lower training effectiveness. | **Positive:** Maintain separate scho evaluated, 16 were identified as in compared to the RCP Alternative a effectiveness when compared to th EPTM, this alternative provides for effective field training, therefore de trained soldiers.<br>**Negative**: Physical separation of housing would reduce any synergi require duplication of staff and ser |

*Source: Harland Bartholomew & Associates, Inc.*

| and Facility Plan Sites | |
|---|---|
| **y's Proposed Training Action mum Training Method (OPTM)** | **Environmentally Preferred Training Method (EPTM)** |
| **Attributes** | **Attributes** |
| parate school identity. Of the 43 training goals ntified as improving in operational efficiency when Alternative and six would improve in training mpared to the EPTM. When compared to the provides for more realism resulting from more therefore developing better skills and better<br><br>paration of headquarters, instruction facilities and any synergism among the three schools and taff and services. | **Positive:** Maintain separate school identity.<br>**Negative: Negative**: Physical separation of headquarters, instruction facilities and housing would reduce any synergism among the three schools and require duplication of staff and services. The training effectiveness would be lower in six training goal when compared to the RCP Alternative and six training goals when compared to the OPTM Alternative, including one critical key chemical school military occupational skill specialty, obscurant field training. |

# SUBSECTION 5.2.5

# Step 1 Summary

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative →<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative →<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative →<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.2.5 STEP 1 - TRAINING ALTERNATIVE IMPACT ANALYSIS SUMMARY

This subsection provides a summary of the information presented in subsections 5.2.1 through 5.2.4.

As referenced in subsection 5.2.1, implementation of the No Action Training Alternative is non-viable as it would result in unacceptable mission and training impacts. Each of the three remaining training alternatives (RCP, OPTM (Army's Proposed Action) and EPTM Alternatives) could be implemented in concert with any of the three land use and facility development plans.

However, based upon the information contained in the preceding analysis, the Relocate Current Practice Alternative training method will be eliminated from further consideration. This elimination is based on the relatively greater level of adverse environmental impacts associated with this alternative versus the "minimal" increase in training readiness offered and the increased operations costs associated with the RCP training methods. Adverse impacts associated with the RCP Alternative include the following items.

- The annual amount of fog oil used for training will exceed not only the existing permit level but also exceed the upper limit of the allowable increase of annual PM10 emissions for the FLW area. The other two alternatives are below that upper limit. The RCP Alternative would use approximately 48 percent more fog oil annually than the OPTM (Army's Proposed Action) and 152 percent more than the EPTM Alternative.

- There would not be any environmental controls implemented at the FFE deterrent training. This would allow rainfall runoff to flow through the training site and transport unburned fuel residue to adjacent streams. Also at this site there would not be any liner placed underneath the wall of flame trench, which would allow the unburned liquid fuel to sink into the soil beneath the trench.

- The FFE deterrent training under the RCP Alternative would use approximately 40 percent more fuel than the OPTM (Army's Proposed Action) Alternative and EPTM Alternative.

- The CDTF would utilize a thermal treatment unit to dispose of decontaminated solid and liquid wastes. An air quality permit to construct the thermal treatment unit has been received from Missouri Department of Natural Resources. There was considerable concern about introducing an incinerator to burn toxic wastes at FLW during the Scoping Meeting and subsequent comments.

- Implementation of the RCP Alternative would expose threatened and endangered species to greater amounts of fog oil and therefore have greater adverse effects than with the OPTM (Army's Proposed Action) and the EPTM Alternative.

- In addition, as discussed in subsection 5.2.2.17 above, implementation of the RCP Alternative Training Method (when compared to the OPTM (Army's Proposed Action) Alternative) would reduce the Training Effectiveness in six of the forty-three training goals.

Consequently, although the RCP Alternative is a feasible alternative, it is not considered a reasonable alternative and is not considered in the subsequent analyses of this EIS.

The construction impacts associated with providing the facilities required to support implementation of either the Optimum Training Method (Army's Proposed Action) Alternative or the Environmentally Preferred Training Method Alternative in conjunction with the three alternative land use and facility plans will be discussed in the following subsections. This section of the analysis, as illustrated on Figure 5.1, is referred to as Step 2 - Facilities Analysis.

# SUBSECTION 5.3.2

# Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative → **Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative → **Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative → **Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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# 5.3 STEP 2 - SUPPORT FACILITIES - LAND USE AND CONSTRUCTION IMPACT ANALYSIS

This subsection provides an analysis of each of the BRAC land use and facility plan alternatives identified in subsection 3.4.2 of the EIS. Subsection 5.3.1 references the reader to subsection 3.4.1 of the EIS for a discussion of the No Action Alternative as it relates to this element of the BRAC action. Subsections 5.3.2, 5.3.3 and 5.3.4 provide an analysis of each of the remaining land use and facility plan alternatives, including the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) as discussed in subsection 5.3.2, Alternative 1 Land Use and Facility Plan Combined Headquarters) as discussed in subsection 5.3.3, and Alternative 2 Land Use and Facility Plan (Separate Headquarters) as discussed 5.3.4. Figure 5.1 has been reprinted on the section divider preceding this step to assist the reviewer in following the analysis process.

The impact analysis is structured to evaluate the impacts associated with the implementation of the eight construction packages (as defined in subsection 2.4.2 and Volume III, Appendix C subsection C.3.2 of the EIS) against the fifteen natural, cultural, sociological and economic resource categories (as discussed in Section 4 and subsection 5.1.1) plus an operational efficiency category. Table 5.39 provides an outline of the analysis structure used in subsections 5.3.2, 5.3.3 and 5.3.4 by resource category. The eight construction packages included in this analysis include:

- General Officers Quarters (Project 38174);
- Sixteen-Building Military Operations in Urbanized Terrain (MOUT) Facility (Project 45892);
- Chemical Defense Training Facility (CDTF) (Project 45893);
- General Instruction Facility (Project 46090);
- Applied Instruction Facility (Project 46091);
- Unaccompanied Personnel Housing (Project 46092);
- Range Modifications (Project 46094); and
- Convert Housing (Project 46640).

**Table 5.39:**
**Matrix Display of Step 2 (Subsections 5.3.2 through 5.3.4) Land Use and Facility Plan Analysis Subsection Numbers**

| Subsection or Impact Analysis Categories | Subsection Numbers - Implementation of the Army's Proposed LU & FP (CH&I) (Subsection 5.3.2) | Subsection Numbers - Implementation of Alternative 1 LU & FP (CH) (Subsection 5.3.3) | Subsection Numbers - Implementation of Alternative 2 LU & FP (SH) (Subsection 5.3.4) |
|---|---|---|---|
| Introduction | 5.3.2.1 | 5.3.3.1 | 5.3.4.1 |
| Land Use & Training Areas | 5.3.2.2 | 5.3.3.2 | 5.3.4.2 |
| Air Quality and Climate | 5.3.2.3 | 5.3.3.3 | 5.3.4.3 |
| Noise | 5.3.2.4 | 5.3.3.4 | 5.3.4.4 |
| Water Resources | 5.3.2.5 | 5.3.3.5 | 5.3.4.5 |
| Floodplains/Surface Water | 5.3.2.5.A | 5.3.3.5.A | 5.3.4.5.A |
| Hydrology/Groundwater | 5.3.2.5.B | 5.3.3.5.B | 5.3.4.5.B |
| Geology and Soils | 5.3.2.6 | 5.3.3.6 | 5.3.4.6 |
| Infrastructure | 5.3.2.7 | 5.3.3.7 | 5.3.4.7 |
| Hazardous/Toxic Materials | 5.3.2.8 | 5.3.3.8 | 5.3.4.8 |
| Munitions | 5.3.2.9 | 5.3.3.9 | 5.3.4.9 |
| Permits/Regulatory Authority | 5.3.2.10 | 5.3.3.10 | 5.3.4.10 |
| Biological Resources | 5.3.2.11 | 5.3.3.11 | 5.3.4.11 |
| Federal T & E Species | 5.3.2.11.A | 5.3.3.11.A | 5.3.4.11.A |

**Table 5.39:**
**Matrix Display of Step 2 (Subsections 5.3.2 through 5.3.4) Land Use and Facility Plan Analysis Subsection Numbers**

| Subsection or Impact Analysis Categories | Subsection Numbers - Implementation of the Army's Proposed LU & FP (CH&I) (Subsection 5.3.2) | Subsection Numbers - Implementation of Alternative 1 LU & FP (CH) (Subsection 5.3.3) | Subsection Numbers - Implementation of Alternative 2 LU & FP (SH) (Subsection 5.3.4) |
|---|---|---|---|
| Other Protected Species | 5.3.2.11.B | 5.3.3.11.B | 5.3.4.11.B |
| Wetlands | 5.3.2.11.C | 5.3.3.11.C | 5.3.4.11.C |
| Aquatic Resources | 5.3.2.11.D | 5.3.3.11.D | 5.3.4.11.D |
| Terrestrial Resources | 5.3.2.11.E | 5.3.3.11.E | 5.3.4.11.E |
| Cultural Resources | 5.3.2.12 | 5.3.3.12 | 5.3.4.12 |
| Sociological Environment | 5.3.2.13 | 5.3.3.13 | 5.3.4.13 |
| Economic Development | 5.3.2.14 | 5.3.3.14 | 5.3.4.14 |
| Quality of Life | 5.3.2.15 | 5.3.3.15 | 5.3.4.15 |
| Quality of Life | 5.3.2.15.A | 5.3.3.15.A | 5.3.4.15.A |
| Human Health and Safety | 5.3.2.15.B | 5.3.3.15.B | 5.3.4.15.B |
| Installation Agreements | 5.3.2.16 | 5.3.3.16 | 5.3.4.16 |
| Operational Efficiency | 5.3.2.17 | 5.3.3.17 | 5.3.4.17 |
| Summary | 5.3.2.18 | 5.3.3.18 | 5.3.4.18 |

*Source: Harland Bartholomew & Associates, Inc.*

The results of the analysis for each subsection are provided in narrative format. In addition, a summary table has been included at the end of each subsection to provide an overview of impacts for that alternative. Furthermore, Impact Matrices (4 through 6) have been included in Volume II to provide a graphic summary of the type and extent of all impacts which have been identified. These impact matrices may be used in association with the narrative provided in this volume to help the reader follow the analysis.

Step 2 concludes with a summary and conclusions associated with the Step 2 BRAC land use and facility plan analysis, and explains the rationale for elimination of the Alternative 2 LU & FP (SH) from further consideration. This summary in located in subsection 5.3.5.

## 5.3.1 NO ACTION ALTERNATIVE

The reader should refer to subsection 3.4.1 for a discussion of this alternative, and the rationale for eliminating the No Action Land Use and Facility Plan Alternative from further consideration.

## 5.3.2 IMPACTS OF THE ARMY'S PROPOSED LAND USE AND FACILITY PLAN (Combined Headquarters and Instruction)

### 5.3.2.1 Introduction

The following describes impacts associated with the implementation of the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) and all associated construction projects. Impact Matrix 4, located in Volume II, provides an illustration of the anticipated impacts which are discussed in subsections 5.3.2.2 thorough 5.3.2.17. Subsection 5.3.2.18 provides a summary of the anticipated impacts associated with implementing the Army's Proposed LU & FP (CH&I).

## 5.3.2.2 Land Use & Training Areas

Implementation of the Army's Proposed LU & FP (CH&I) will result in the modification of five land use zones within the cantonment, including:

- expansion of an existing Troop Housing area east of Lincoln Hall to the north and west;
- adjustment of an existing Reserved/Buffer area to separate the expanded Troop Housing area near Lincoln Hall from the surrounding Training land use area;
- conversion of the existing Family Housing area along Indiana Avenue to Troop Housing for senior UEPH and UOPH;
- conversion of an existing Industrial area west of the 800-area barracks to Training area; and
- conversion of a Recreation area to Community Facilities land use northeast of the intersection of Jordan Road and South Dakota Avenue.

These areas are illustrated on Figure 3.2, Army's Proposed BRAC Land Use Plan (Combined Headquarters and Instruction) which is located in Section 3. Construction sites that would be used if this land use and facility plan were implemented are illustrated on Figure 3.3, Army's Proposed BRAC Facility Siting Plan (Combined Headquarters and Instruction) which is also located in Section 3.

**5.3.2.2.1 General Officers Quarters (Project 38174).** Construction of the General Officers Quarters, along the northwest side of Piney Hills Drive, would place these two new family housing units in a Family Housing land use area. This particular Family Housing area has further been defined as a Senior Officers Housing Area. This land use area is the preferred land use zoning for this project. This project will be compatible with the area. It is not anticipated to have any direct or indirect impacts on the surrounding area.

**5.3.2.2.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** As specified in the Army's Proposed LU & FP (CH&I), the 16-building MOUT project will be located within an area designated for training.

- **Indirect Impacts.** Construction will require that training activities currently conducted on this training area be relocated to other nearby areas, resulting in an indirect short-term adverse impact on these activities.

**5.3.2.2.3 Chemical Defense Training Facility (Project 45893).** As discussed in subsection 5.2.2.2 construction and operation of the CDTF will require the establishment of a 985-foot (300-meter) (radius) restricted access security area surrounding the facility. This area will be restricted to training and activities directly related to the CDTF, and installation traffic on the nearby all-weather range roads. The intent in establishing the area is to create a security zone around the CDTF that could be used in the unlikely event of an accident at the CDTF. The use of this security area for training in support of the CDTF is consistent with the Training land use designation.

- **Indirect Impacts.** Construction of the CDTF will require that training activities currently conducted at TA 246 be relocated to other nearby training areas and that hunting would not be allowed nearby. However, these adjustments will not result in any adverse impact to existing land use relationships.

**5.3.2.2.4 General Instruction Facility (Project 46090).** Construction of the General Instruction Facility project will consist of interior renovations at Hoge, Lincoln and Clarke halls; construction of a new building north of Lincoln Hall; and reallocation of areas within Clarke Hall library and unit administrative areas at Specker Barracks.

- **Direct Impacts.** This construction north of Lincoln Hall will occur with in an area designated for Administration. The nature of the facility which will be constructed is consistent with the existing training and administrative functions located in the area. Construction of this project will not

require the relocation of any existing Training Areas. Collocation of functions near Lincoln Hall will be beneficial as it will provide new training areas that may be used by each of the (Chemical, Engineer and Military Police) schools thereby reducing the long-term costs associated with providing individual dedicated facilities. This location also provides increased flexibility in the assignment of both the new and existing facilities. Reallocation of the existing areas with in Hoge, Lincoln and Clarke halls, General Leonard Wood Army Community Hospital, and Specker Barracks will be consistent with the existing uses.

- **Indirect Impacts.** Location of the numerous training, administrative and support activities specified for the area north of First Street (near the existing Engineer Headquarters) will result in an adverse impact from the increased traffic flow and congestion in the area. However, collocation of the headquarters will reduce traffic on the interior of the installation, when compared to the other alternatives.

**5.3.2.2.5 Applied Instruction Facility (Project 46091).** The Applied Instruction Facility project (under this land use and facility plan) includes the provision of facilities to support five diverse functions. Construction and renovation efforts required to support the five functions include the:

(1) Renovation of Building 5265 and reallocation of other existing, available vehicle maintenance facilities with associated vehicle parking areas for use in vehicle maintenance and vehicle maintenance training. Building 5265 is the existing DOL Vehicle Maintenance Facility and has available requisite capacity to support both vehicle maintenance, maintenance training and organizational vehicle parking. Part of the available area will be renovated and used for BIDS and FOX vehicle maintenance and maintenance instruction. The remainder of the area will be used for the maintenance of other vehicles relocated to FLW as part of the proposed action. Exterior parking areas near Building 5265 will be used of organizational vehicle parking. Vehicles from the 11th Chemical Company and the 20th Chemical Detachment will be maintained and parked in other existing, available vehicle maintenance and parking facilities.

(2) Renovation of existing warehouse buildings 2310 and 2311 to provide additional, dedicated storage for the relocated activities.

(3) Construction of an addition to Walker Museum to house the collections of the U.S. Army Military Police Museum and the U.S. Army Chemical Museum.

(4) Construction of a DATF northwest of the intersection of South Dakota and Alabama avenues. The DATF will include applied and general instruction classrooms, covered and uncovered exterior training areas, administrative areas and storage areas.

(5) Construction of a Military Police Patrol Incidents Training Area (MP Village) southwest of the intersection of South Dakota and Alabama avenues. The MP Village area will include applied and general instruction classrooms, covered and uncovered exterior training areas, administrative areas and storage areas.

- **Direct Impacts.** The use of existing, available areas at buildings 5265, 2310 and 2311 will not require any modification to the existing land use pattern. The addition to Walker Museum will require the conversion of approximately 3 acres of Recreation area to Community Facilities land use northeast of the intersection of Jordan Road and South Dakota Avenue. This conversion will have no impact on other installation functions and have negligible impact on recreation. Construction of both the DATF and MP Village will require conversion of approximately 53 acres of industrial area to training. These two new training facilities will be consistent with the existing character of the area, resulting in no impact on other installation functions.

- **Indirect Impacts.** Collocation of vehicle maintenance, vehicle parking, warehousing and artifact storage activities will have a long-term potential for beneficial impacts associated with reduced maintenance and personnel requirements. Construction of both the DATF and MP Village will

place these facilities proximate to the proposed billeting (in the 600- through 800-area barracks) of the students which will use these facilities most often. This will result in a beneficial impact from reduced transportation costs and lesser time delays in travel.

**5.3.2.2.6 Unaccompanied Personnel Housing (Project 46092).** As delineated in this land use plan, this construction project will provide approximately 888 new barracks spaces and a new dining facility north of Lincoln Hall.

- **Direct Impacts.** Construction of this project will require the conversion of an approximately 22-acre area north of Lincoln Hall to Troop Housing from Recreation and adjustment of the buffer area north of Lincoln Hall. Both of these actions will have beneficial impacts on installation land use. Location of the barracks north of Lincoln Hall will collocate interrelated facilities, while adjustment of the buffer will provide an attractive built environment.

- **Indirect Impacts.** As discussed in subsection 5.2.2.2.1, conversion of the area north of Lincoln Hall into Troop Housing will eliminate an existing Recreation area which contains two soccer fields and three softball fields. These fields will be replaced with fields in the central open area of the cantonment making them more accessible and therefor result in beneficial impacts on the installation land use plan as discussed in subsection 5.2.2.15. Construction of the new barracks in this area will also place the students that will be using the classrooms in Hoge and Lincoln halls and the new facility located north of Lincoln Hall within a short walk of their billets thereby resulting in reduced long-term transportation costs and time delays.

**5.3.2.2.7 Range Modifications (Project 46094).** Implementation of the Range Modifications package will include construction, modernization, renovation or alteration at a total of 27 different range and training areas. The scope of the construction effort varies depending upon the site and the training requirements that will be relocated.

- **Direct Impacts.** As specified in the Army's Proposed LU & FP (CH&I), all of the Range Modification project sites are located within areas designated training. Consequently, there will be no direct land use related impacts associated with this construction effort.

- **Indirect Impacts.** Construction and operation of these facilities will generate noise, safety and other operational impacts on surrounding land uses. However, by collocation of these similar functions (as was done in previous land use plans at Fort Leonard Wood) the anticipated impacts of these actions are minimized. Collocation and overlaying of the safety zones associated with the ranges has a beneficial effect by reducing the total amount of land area required. As specified, the range modifications will relocate several ranges from the west side of FLW 1 to along the east side of FLW 1, reducing the size and altering the locations of range safety zones along the west side of FLW 1. This will result in more efficient use of existing land resources.

**5.3.2.2.8 Convert Housing (Project 46640).** Implementation of this land use plan will include the redesignation of existing, available Family Housing units to Troop Housing. The project will also reallocate existing barracks assignments within Specker Barracks, renovate UPH, Officer housing at Sturgis Heights, and renovate and reactivate an existing dining facility at Specker Barracks. However, each of these items is located within the recommended land use area.

- **Direct Impacts.** At the present time these excess, available housing units are "winterized" and vacant. Although receiving a minimal amount of maintenance, the area still has a fairly negative visual appearance. Reassignment of these vacant units will restore a "lived in" appearance to the area resulting in beneficial impacts on the visual character of the installation. As defined in the existing Master Plan, a pleasing visual environment was one of the key elements in defining the benefits of implementing the Master Plan. Additionally, as all of the vacant, available units have been collocated in one area, a distinct area at the northern edge of the housing area can be converted, thereby minimizing impacts on nearby Family Housing residents.

- **Indirect Impacts.** Residents of the converted housing will receive increased personnel living areas and increased privacy resulting in an improved quality of life as discussed in subsection 5.2.15.2. The reuse of these otherwise excess Family Housing Units will also reduce initial construction costs and long-term maintenance costs, thereby improving the functional efficiency of the installation and improving land use.

## 5.3.2.3 Air Quality and Climate

The following issues related to air quality and climate have been identified with the implementation of the proposed action at FLW:

- Particulate Matter (Dust) Emissions During Construction Activities; and
- Air Emissions From Utilities.

### 5.3.2.3.1 Issue: *Particulate Matter (Dust) Emissions During Construction Activities.*

Construction activities not only includes the physical construction of the structure, but also the site development. Particulate matter is emitted during construction activities not only as a result from heavy construction earth moving equipment and trucks, but also with the actual construction of structures. Emissions can be associated with other construction such as land clearing, drilling and blasting, ground excavation, and cut and fill operations. Dust emissions can vary from day to day varying on the type of operations, level of activity, and meteorological conditions. Precipitation plays an important role in minimizing dust emissions. Any potential air impacts from construction activities are considered to be short-term because the construction is short-duration.

Particulate matter is regulated by 10 CSR 10-6.170 which restricts particulate matter beyond the premises of origin. In other words, particulate matter may not be visible beyond the property line. Missouri Department of Natural Resources may require methods to curtail these emissions by such measures as applying water to the surface during earth moving operations. This rule would also be applicable to the demolition of existing structures and buildings, where new facilities are being sited.

- **Direct Impacts.** Particulate matter will be emitted into the air during construction activities although construction particulate is generally large in diameter and is not expected to travel very far because of the particle size, the hilly terrain, and the heavy vegetation. The quantity of emissions is proportional to the area of land being developed and the level of construction activity. Dust emissions have a temporary impact on local air quality because construction is usually considered a nonrecurring activity. For PSD modeling purposes, particulate emissions due to BRAC construction occur before fog oil training commences and are incorporated as background emissions which do not consume PSD increment. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

- **Indirect Impacts.** The indirect impacts could potentially be the visible particulate matter down wind of the construction activities.

### 5.3.2.3.2 Issue: *Air Emissions From Utilities.*

With the additional military and civilian personnel being located at Fort Leonard Wood and the associated housing and buildings, the utility usage will increase as will the corresponding air emissions from boilers. The boilers at the installation primarily burn natural gas, but several boilers use fuel oil No. 6 (although very minimal) and No. 2.

Movement of personnel to FLW will increase fuel consumption for boilers. The increased energy requirements are based on data taken from the DD Form 1391s for each individual project. Table 5.40 summarizes the requirements. The energy requirements were only available for this alternative.

- **Direct Impacts.** Typical air emissions from boilers include both criteria pollutants and hazardous air pollutants. See Table 5.41 for the estimated increase in emissions from the boilers. The Air Quality Technical Reference Document contains the emission factors and assumptions used to

estimate the emissions from boilers. The calculations are based on both the use of fuel oil (assuming 0.5% sulfur) and natural gas as indicated. The only boilers at FLW that are currently permitted are those at the hospital (MDNR air permit # 0794-011). The final boiler design and specifications (including boiler size) will not be known until the overall construction project designs are completed. However, it is currently estimated that the General Instruction Facility will require the largest new boiler as a result of the BRAC action. This boiler, which will be used solely for space heat, will burn natural gas exclusively and will be approximately 6 million British Thermal Units (BTU) per hour in size. The current Missouri construction permitting regulations exempt office and commercial buildings space heating for boilers that use natural gas exclusively and are less than 20 million BTU per hour. As a result, this boiler would be exempt from the construction permit program in Missouri (see Missouri 10 CSR 10-6.060). However, all new boilers as a result of the BRAC action will be addressed during the Title V process and evaluated for inclusion, possibly categorized as "insignificant activities required to be listed". The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

- **Indirect Impacts.** Because this source emits both NOx and hydrocarbons, indirect effects includes contributing to the formation of ground level ozone. Ambient air monitoring will be conducted for ozone as required by the fog oil permit. Details of the monitoring can be found in the Monitoring Plan Summary provided in Appendix K.

**Table 5.40:**
**Fort Leonard Wood Energy Requirements**

| | Land Use and Facility Plan | | | | |
|---|---|---|---|---|---|
| **Title** | **Army's Proposed LU & FP (CH&I) [1]** | **Alternative 1 LU & FP (CH) [1]** | **Alternative 2 LU & FP (SH) [1]** | **Unit** | **Army's Proposed LU & FP (CH&I) Energy Requirements (Million Btu/Yr)** |
| Existing, Available Facilities | 850,542 | 613,176 | 589,232 | SF | 40,745 (Fuel Oil) |
| General Officer Quarters (Project 38174) | 4,200 | 4,200 | 4,200 | SF | 240 (Natural Gas) |
| Sixteen-Building Military Operations in Urbanized Terrain (MOUT) Facility (Project 45892) | 78,500 | 78,500 | 78,500 | SF | 280 (Natural Gas) |
| Chemical Defense Training Facility (Project 45893) | 68,500 | 68,500 | 68,500 | SF | 13138 (Natural Gas) |
| General Instruction Facility (Project 46090) | 300,000 | 375,000 | 395,000 | SF | 18534 (Natural Gas) |
| Applied Instruction Facility (Project 46091) | 198,000 | 345,000 | 345,000 | SF | 15851 (Natural Gas) |
| Unaccompanied Personnel Housing (Project 46092) | 888 | 1,662 | 1,662 | SP | 17032 (Natural Gas) |
| Range Modifications (Project 46094) | 27 | 27 | 27 | EA | 1949 (Natural Gas) |
| Convert Housing (Project 46640) | 194 | 0 | 0 | UNITS | 12,481 (Natural Gas) |

*Notes:* *1. All areas and estimated costs are approximate*
*SF = Square Feet*
*EA = Each*
*SP = Spaces*

*Source: Harland Bartholomew & Associates, Inc.*

| Table 5.41: Estimated Air Emissions From Boilers - Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) | |
|---|---|
| **Pollutant** | **Total Emissions (tons/yr)** |
| **Criteria Pollutants** | |
| Nitrogen Oxides (NOx) | 6.75 |
| Sulfur Oxides (SOx) | 10.60 |
| Particulate Matter (PM10) | 0.61 |
| Total Hydrocarbons | 0.25 |
| Carbon Monoxide (CO) | 1.56 |
| *Source: Harland Bartholomew & Associates, Inc.* | |

## 5.3.2.4 Noise

Several actions related to the BRAC realignment have the potential to create noise impacts. These include:

- construction activities at all eight construction sites; and
- noise from traffic near the Lincoln, Hoge and Clarke Hall complex following completion of the General Instruction Facility construction project.

**5.3.2.4.1 Issue: *Construction Noise.*** Each of the eight construction project packages will generate noise levels above the baseline conditions and will create direct short-term adverse impacts on nearby activities. The construction noise will be transient and for the most part confined to daylight hours. Construction locations that will increase noise levels include those illustrated on Figure 3.3, Army's Proposed BRAC Facility Siting Plan (Combined Headquarters and Instruction) (located in subsection 3.4.2).

### 5.3.2.4.2 Issue: *Traffic Near the Lincoln, Hoge and Clarke Hall Complex.*

- **Direct Impacts.** The construction of this project package is not anticipated to significantly affect the noise environment.

- **Indirect Impacts.** The effects of noise generated by vehicular traffic will be determined by traffic travel routes and the number of trips required. Construction of the General Instruction Facility north of Lincoln Hall, under the Army's Proposed Land Use plan, will concentrate a number of functions in this already congested area of the cantonment. The travel of personnel to and from this area, when combined with through traffic, will generate additional traffic noise along Nebraska Avenue. The additional noise generated by this traffic would be incompatible with the instructional and administrative character of the nearby buildings. Therefore, in order to provide an increased noise buffer, Nebraska Avenue, between 1st Street and Headquarters Avenue, will be realigned to the west.

  Implementation of this land use plan will however place the Billets that will be used by Non-Commissioned Officer students within walking distance of the collocated NCOA, reducing the amount of traffic that would be generated by students commuting between their billets and classrooms when compared to the alternative land use plans.

## 5.3.2.5 Water Resources

This section examines the potential effects of the construction activities on the water resources within the installation. As described in Section 3, there are three components of the proposed action. The following

paragraphs identify and describe issues associated with the construction packages that may impact water resources. The discussion has been divided into two parts: surface water and floodplains (subsection 5.3.2.5.A) and hydrogeology/groundwater (subsection 5.3.2.5.B).

Environmental controls will be followed during construction and training activities in order to limit the potential of erosion at construction and training areas. A listing of Construction Environmental Controls is located in subsection 5:1.4.2, while a listing of Training Activity Environmental Controls is located in subsection 5.1.4.2.

None of the proposed projects are located in any regulatory floodway. Training goals with projects in the floodplain areas include: TG 7.3 Obscurant Employment Operations (Mobile); TG 7.4 Obscurant Employment Operations (Field); and TG 7.6 Obscurant Storage Operations. The facilities to be constructed include parking lots and roadways. No direct or indirect adverse impacts will occur.

Hasty decontamination training sites were selected upstream from stormwater monitoring sites included within NPDES Permit No. MO-0117251. Table H.1 in Volume III, Appendix H of the EIS specifies the location, frequency and types of items that will be monitored for in stormwater.

## 5.3.2.5.A Surface Water and Floodplains

Implementation of the planned BRAC construction packages at FLW could result in runoff from construction sites entering surface waters. This runoff may contain increased levels of sediment, contaminants and construction debris. Construction activities could disturb soils increasing the erosion potential at the construction site. Contaminants from construction equipment (such as oils or grease) may runoff from the site and enter surface waters.

With the completion of the BRAC construction packages at FLW, the amount of impervious surfaces (parking lots or buildings) will be increased. This increase could alter the hydrology of a given drainage area. However, the impacts are likely to be minor, based on: location of the buildings in the cantonment area with an already established stormwater conveyance system; site specific stormwater detention basins for projects with large parking areas or on sites with steep topography; and most of the range projects are minor modifications as part of range modifications and renovations rather than new construction.

In order to determine the extent of potential impacts from the three land use plans, analysts preparing the surface water, air quality, geology and soils, and biological resources portions of the EIS developed an acreage impact methodology. Areas disturbed by construction or construction related activities were estimated by using the following procedures:

- The 35 percent completion design drawings for the Army's Proposed Land Use Plan were obtained and used to determine a project 'footprint'. The area (in acres) within the project footprint was calculated, and the project footprint was outlined on clear acetate sheets. The outline was placed over potential project sites on 1:400 scale 1994 aerial photographs, and, by using the project footprint, site layouts for the Alternative 1 LU & FP (CH) and the Alternative 2 LU & FP (SH) were determined and compared with those for the Army's Proposed LU & FP (CH&I). The site layouts were positioned in locations determined by FLW DPW Master Planning, and the analyst team insured that key design features were maintained.

- The acreage of developed land, grassland/old field, and shrub/forest contained within the outer limits of project footprints was measured, thus providing a maximum area that could be potentially disturbed by actual clearing or impacted by adjacent clearing on-site. The actual impacts will be less than the maximum identified in this procedure and used to compare the alternatives. The potential for soil erosion was established for each project using the Soil Conservation Service soil survey map of highly erodible soils. The topography and type of vegetation cover present were also considered. The resulting measurements were tabulated by project, watershed and current vegetation coverage.

Construction activities from the Army's Proposed LU &FP (CH&I) could disturb approximately 983 acres of the FLW installation. This acreage was determined using the methodology described in the two preceding paragraphs. Approximately 70 percent of this acreage is currently undeveloped and covered with vegetation such as trees, brush or grassland. The remaining 30 percent of the project area is currently developed or improved, including roads, parking lots, buildings, developed training ranges or other disturbed areas. Developed areas include existing facilities and extensively maintained vegetated areas such as lawns. The acreage associated with the individual construction packages are discussed in subsections 5.3.2.5.A.1 through 5.3.2.5.A.8. Direct impacts to soils are described in subsection 5.3.2.6.

All construction projects will include the use of Construction Environmental Controls to eliminate or reduce short-term and long-term impacts and to ensure compliance with Federal, state and local regulations, including Missouri Clean Water requirements, at FLW. These practices include:

- the implementation of erosion control measures during construction such as the construction of erosion and sediment control measures as the first step in construction, the maintenance of erosion and sediment control measures throughout the construction process, staging of construction activities to minimize the exposure time of cleared surfaces, and the staging of activities to allow for stabilization of disturbed soils;

- reestablishment of temporary and permanent vegetative cover at construction sites through plantings, seed or sod with both native and ornamental plants (although an emphasis will be placed on the use of native plantings), the stripping and stockpiling of top soil, spreading top soil after construction, mulching all seeded areas, and the use of existing natural features for landscaping at construction sites; and

- provision of surface water and stormwater runoff controls, including drainage swales, both temporary and permanent surface water sediment retention and control catchment basins and ponds, curbs, gutters, and drop inlets.

Altered areas within existing facilities, additions to existing facilities, and newly constructed facilities will meet current Army Energy Conservation requirements

- **Indirect Impacts.** The following impacts discussed are associated with the construction packages in subsections 5.3.2.5.A.1 through 5.3.2.5.A.8.

Runoff from the construction sites can create a short-term indirect adverse impact on surface waters. The severity of the short-term impact depends on the quantity of soils displaced during construction. Sediment loading in streams may increase turbidity and affect other water quality parameters such as dissolved oxygen, pH, and conductivity.

FLW will be required to obtain a Missouri State Operating Permit under the Water Pollution Control Program of the MDNR Clean Water Commission for the construction of new facilities. This permit is in compliance with the Missouri Clean Water Law (Chapter 644 R.S. MO as amended) and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress). As in the past and currently, FLW will need to apply to be included in the State General Storm Water Permit as required by 10 CSR 20-6.200 for any area disturbed that is greater than five acres (2 hectares) and will be required to implement soil erosion control and stabilization measures. According to the requirements of the permit, storm water discharges must comply with the Water Quality Standards 10 CSR 20-7.031 (3), and the permit will contain a detailed description of the water quality sampling requirements. By operating under the guidelines established by the MDNR permits and by using Best Management Practices (BMPs) as outlined in subsection 5.5.1.2, there will be no significant adverse impacts to surface waters as a result of new facility construction.

**5.3.2.5.A.1 General Officers Quarters (Project 38174).** Under this package the Army's Proposed LU & FP (CH&I) could disturb approximately two acres of vegetation. The disturbance of two acres (0.8 hectare) of vegetation could increase the potential for erosion and sediment runoff. Runoff would enter the Big Piney through an unnamed tributary. A substantial portion of the two acres disturbed could be converted to an impervious surface. As a result infiltration would be decreased and storm water runoff would increase. Under this package, construction activities would not take place within 0.25 miles (0.4 km) of a surface waterbody.

**5.3.2.5.A.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Construction activities associated with the Army's Proposed LU & FP (CH&I) could disturb approximately nine acres of land. Six of the nine acres disturbed are considered to be undeveloped. Disturbance of this area could increase the potential for erosion and sediment runoff. This project site is located within 0.25 miles (0.4 km) of existing storm drainage channels. Runoff from the construction site would enter Roubidoux Creek through Smith Branch. The construction of this package would convert a substantial portion of the undeveloped project site to an impervious surface.

**5.3.2.5.A.3 Chemical Defense Training Facility (Project 45893).** Under this construction package, approximately twenty-three acres (9.2 hectares) of land could be disturbed under the Army's Proposed LU & FP (CH&I). Twenty-one (8.4 hectares) of the acres disturbed are considered to be undeveloped and could increase the potential for erosion and sediment runoff. Runoff would enter Roubidoux Creek through Smith Branch/Ballard Hollow. The construction of the facility will convert a substantial portion of the undeveloped project site to an impervious surface. Storm water runoff would be retained within a sediment control pond prior to discharging into existing stream channels. The project is located within 0.25 miles (0.4 km) of existing storm drainage channels.

**5.3.2.5.A.4 General Instruction Facility (Project 46090).** This construction package involves the use of existing structures and the construction of a new facility. Construction activities associated with the use of an existing structure may not disturb soils or increase the amount of impervious surfaces. Thus, no impact to surface waters would be anticipated. However, the construction of a new facility could disturb approximately 55 acres (22 hectares) of land. Roughly half of this area is considered to be undeveloped which increases the potential for erosion and the magnitude of runoff. A substantial portion of the undeveloped project site will be converted to an impervious surface. As a result, infiltration will be decreased and storm water runoff would increase.

**5.3.2.5.A.5 Applied Instruction Facility (Project 46091).** This construction package involves the use of existing structures and the construction of new facilities. Construction activities associated with the use of an existing structure may not disturb soils or increase the amount of impervious surfaces. Thus, no impact to surface waters would be anticipated. However, the construction of new facilities could disturb 41 (16.4 hectares) acres of land. Roughly 46 percent of this area is considered to be undeveloped which increases the potential for erosion and sediment runoff. A substantial portion of the undeveloped area could be converted to an impervious surface. Under this package, construction activities would not take place within 0.25 miles (0.4 km) of a surface water body.

**5.3.2.5.A.6 Unaccompanied Personnel Housing (Project 46092).** Under the Army's Proposed Land Use Plan, this construction package could disturb 78 acres (31.2 hectares) of land. Of this area, approximately 50 percent is considered undeveloped which increases the potential for erosion and sediment runoff. A substantial portion of the undeveloped area could be converted to an impervious surface. This package includes the construction of a storm water detention basin. This basin would collect storm water runoff from the site and discharge to Dry Creek. Under this package, construction activities would not take place within 0.25 miles (0.4 km) of a surface water body.

**5.3.2.5.A.7 Range Modifications (Project 46094).** Under this construction package, several ranges would undergo modifications. These modifications involve a variety of existing ranges and the construction of new training areas. Overall a total of 775 acres (310 hectares) of land could be disturbed within the Big Piney River and Roubidoux Creek drainage areas. Of these 775 acres of land, 74 percent is considered to be undeveloped. Range modifications generally involve earth movement and clearing. This

creates a potential concern since 15 percent of the total acreage potentially disturbed has a high soil erosion potential. The areas with high erosion potential have steep contours and highly erodible soils, as defined by the USDA Soil Conservation Service. A substantial amount of the undeveloped land would remain as a pervious surface. Infiltration would continue and an increase in the magnitude of storm water runoff is not anticipated. Substantial projects within the package include the following:

Big Piney River Drainage Area

- M60/M240 Familiarization and Qualification, 45 acres disturbed (McCourtney Hollow);
- Mark 19 Familiarization, 322 acres disturbed (McCourtney Hollow);

Roubidoux Creek Drainage Area

- Evasive Driving, 73 acres (29 hectares) disturbed (Smith Branch);
- Flame Field Expedient Deterrent Training Area, 85 acres (34 hectares) disturbed (McCann Hollow);
- Mobile Smoke Training, 18 acres (47 hectares) disturbed (Ballard Hollow);
- Mobile Smoke Training, 111 acres 44 hectares) disturbed (Bailey/McCann Hollow); and
- Special Reaction Team Marksman/Observer, 44 acres (18 liters) disturbed (Smith Branch).

Much of this area is already highly disturbed. It contains existing ranges, roads and firebreaks. Ranges area managed for fire protection, erosion, wildlife and habitat.

Many of the project sites are located within 0.25 miles (0.4 km) of existing storm channels or surface water bodies. These sites include:

- P-5 Flame Field Expedient Deterrents Training Range;
- P-6 NBC Warning and Reporting Field/Maneuver (storm drainage);
- P-9 FOX Vehicle Swim (amphibious) Field/Maneuver;
- P-11 NBC Survival Recovery (storm drainage);
- P-12 Obscurant, Employment Operations (Static Training);
- P-13 Obscurant, Employment Operations (Mobile and Field Training) (Ballard Hollow);
- P-14 Obscurant, Employment Operations (Mobile and Field Training) (Bailey/McCann Hollow);
- P-15 Obscurant, Employment Operations (Mobile and Field Training) (Cannon Range (Mush Paddle Hollow));
- P-16 Obscurant, Employment Operations (Mobile and Field Training) (Musgrave Hollow);
- P-17 Obscurant, Employment Operations (Mobile and Field Training) (Ballard Hollow);
- P-17a Obscurant Storage (Ballard Hollow);
- P-20 M60/M240 Familiarization and Qualification Range (storm drainage);
- P-21 Marine NBC Training (storm drainage);
- P-22 Marine Shotgun Range (storm drainage);
- P-23 Mark 19 Familiarization and Qualification Range;
- P-25 Special Reaction Team Marksman/Observer Range;
- P-26 Special Reaction Team Range;
- P-28 Range Control, general instruction;
- P-29 Relocate Range 29 (storm drainage);
- P-30 Relocate Range 30 Day/Night;
- P-31 Relocate Range 30 F;
- P-33 Relocate Zero Fire (M16) Range (storm drainage);
- P-34 9 mm Pistol (Fire Arms Training Simulator);
- P-35 Marine 9 mm (storm drainage); and
- P-36 Marine Combat Pistol (storm drainage).

The Mark 19 familiarization involves the modification of an existing range. This range modification could disturb approximately 322 acres 129 liters) of land. Of these 322 acres, 297 (119 hectares) are undeveloped and covered with vegetation such as trees, brush or grassland. Disturbance of this area

may lead to increased runoff, soil erosion and other potentially adverse impacts to surface waters. To reduce the impacts to McCourtney Hollow, a detention basin should be constructed to collect runoff from the site.

The construction activities associated with the mobile smoke training areas could impact approximately 130 acres (52 hectares) of land. This package includes detention basins sized to accommodate the additional runoff from road construction and widening. The mobile smoke training area in Ballard Hollow presents a concern for surface waters, because of an unimproved stream crossing on Roubidoux Creek. The affected portion of Roubidoux Creek is within a losing section of stream that is normally dry. Impacts to surface waters can be minimized by restricting or eliminating access to the creek when there is flowing water.

**5.3.2.5.A.8 Convert Housing (Project 46640).** This construction package involves the use of existing structures. The existing structures which will be converted to UPH use as part of this project are located within 0.25 miles (0.4 km) of a surface waterbody. Construction activities associated with the use of an existing structure will not disturb soils or increase the amount of impervious surfaces. Thus, no impact to surface waters would be anticipated.

## 5.3.2.5.B Hydrogeology/Ground Water

Implementation of the planned BRAC construction packages at FLW will result in runoff from construction sites. This runoff may contain increased levels of sediment, contaminants and construction debris. Construction activities could disturb soils, thereby increasing the erosion potential at the construction site. Contaminants from construction equipment (such as oils, grease or fluids) may run off. Most of the run off will enter surface waters (discussed in subsection 5.3.2.5.A). However a small portion may enter the ground-water system by flowing into sinkholes. As discussed in subsection 4.6, there are a number of sinkholes at FLW. Hydrogeological studies (FLW, 1996a) indicate that few of the sinkholes have open swallow holes that would allow runoff to directly enter the ground water system. In most instances, the sinkholes have an obstruction of either sediment or an organic mat which restricts the flow of water. Sediment carried by the water running off of the construction sites may deposit in the sinkholes with an obstructed outlet, further obstructing the flow of water to the ground water system. Because most of the runoff from the construction sites will go to surface water, and the volume of runoff from the construction sites entering ground water is minuscule compared to the total volume of recharge, the impact of the construction will be indirect, and will be insignificant. In addition, most construction will be greater than five acres, requiring application for inclusion in the State General Storm Water Permit. Surface water monitoring (see Volume III, Appendix H), will ensure that water runoff meets all applicable standards.

**5.3.2.5.B.1 General Officers Quarters (Project 38174).** Under the Army's Proposed LU & FP (CH&I) approximately two acres could be disturbed to construct the General Officers Quarters. The site selected for this project is in an area with relatively steep slopes. Therefore there is a high potential for erosion during the construction process. The area selected for the facility is not in an area with sinkholes identified on Figure 4.7.

**5.3.2.5.B.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Under the Army's Proposed LU & FP (CH&I), approximately nine acres (4 hectares) could be disturbed for the construction of the MOUT. The construction will occur in an area with moderate slopes and a soil type that is not particularly prone to erosion. The area selected for the facility is not in an area with identified sinkholes.

**5.3.2.5.B.3 Chemical Defense Training Facility (Project 45893).** Construction of the Chemical Defense Training Facility will take place west of Forney Airfield under the Army's Proposed LU & FP (CH&I). This construction could impact approximately 23 acres (9 hectares). The location selected for the facility lies within an identified linear trend of sinkholes, with several sinkholes identified within 800 feet (240 meters) of the construction site.

**5.3.2.5.B.4 General Instruction Facility (Project 46090).** Under the Army's Proposed LU & FP (CH&I), approximately 55 acres (22 hectares) could be disturbed for new construction contained in the General Instruction Facility (Project 46090). The site of the facility is just north of the area where a linear trend of in the distribution of sinkholes has been identified. However, due to the slope of the site, runoff from the site will follow surface water pathways to the east and northeast of the site.

**5.3.2.5.B.5 Applied Instruction Facility (Project 46091).** This construction package in the Army's Proposed LU & FP (CH&I) entails the construction of two facilities in the southwestern portion of the cantonment area as well as renovation of existing buildings. The renovations will not disturb soils and will not impact ground water. The construction of the new facilities could disturb 41 acres (16 hectares). The new facilities will be in the vicinity of several identified sinkholes. However, the disturbed areas have relatively gentle slopes, which will minimize the potential for sediment laden run off to reach sinkholes.

**5.3.2.5.B.6 Unaccompanied Personnel Housing (Project 46092).** This construction, under the Army's Proposed LU & FP (CH&I), would disturb approximately 78 acres (31 hectares). One sinkhole is located approximately 500 feet (150 meters) southwest of the proposed construction site.

**5.3.2.5.B.7 Range Modifications (Project 46094).** Under the Army's Proposed LU & FP (CH&I) a number of ranges would undergo modifications. This package includes modification to a number of existing ranges as well as the establishment of several new training areas. Approximately 775 acres (310 hectares) could be impacted as a part of this package. Most of the range modification are in the southern portion of the base, where sinkholes are less common. In addition, many of the areas have previously been disturbed through training activities associated with the existing mission at FLW.

**5.3.2.5.B.8 Convert Housing (Project 46640).** This construction package involves the renovation and reuse of existing structures.

## 5.3.2.6 Geology and Soils

This section examines the potential effects of the construction activities on the soil and geology at the installation. As described in Section 3, there are three components of the proposed action. The following paragraphs identify and describe issues of concern in the impact of the construction packages.

Construction activities will disturb soils and runoff patterns, which will result in an increased soil erosion potential at the construction sites. This will create a long-term adverse impact on soils. The severity of the impact will be dependent upon the area covered by the construction project, the slope in the area and the soil type. Projects covering less than five acres (2 hectares) are considered to have a minimal impact. Projects ranging from 6 to 200 acres (2.4 to 80 hectares) are considered to have an adverse impact. Projects exceeding 200 acres (80 hectares), or where 10 acres (4 hectares) or more are considered to have a high soil erosion potential are considered to have a significant adverse impact. The soil erosion will lead to indirect impacts to surface water resources and aquatic resources, which are discussed in subsections 5.3.2.11.D and 5.3.2.5.A, respectively. Soil erosion control is included as a general requirement in the construction contracts for these projects.

The geologic units at FLW are known to have karst features that can lead to gradual or catastrophic collapse. These conditions are more prevalent in the northern portion of the reservation, where the Roubidoux Formation and the Gasconade Dolomite are present at the surface. Subsurface testing will be conducted to identify site-specific soil and geologic conditions at all final BRAC construction sites. This data will be used to design appropriate foundation and building systems.

A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

**5.3.2.6.1 General Officers Quarters (Project 38174).** Under the Army's Proposed LU & FP (CH&I), approximately two acres could be disturbed to construct the General Officers Quarters. The site selected for this project is in an area with relatively steep slopes. Therefore there is a high potential for erosion

during the construction process. Mitigation measures as described in subsection 5.5.1.2 will be utilized to minimize erosion during the construction process.

**5.3.2.6.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Under the Army's Proposed LU & FP (CH&I), approximately 9 acres (4 hectares) could be disturbed for the construction of the MOUT. The construction will occur in an area with moderate slopes and a soil type that is not particularly prone to erosion.

**5.3.2.6.3 Chemical Defense Training Facility (Project 45893).** Construction of the Chemical Defense Training Facility will take place west of Forney Airfield under the Army's Proposed LU & FP (CH&I). This construction could impact approximately 23 acres (9 hectares). The site has relatively low slopes and soils with a moderate erosion potential. Therefore soil erosion will be low to moderate for the size of the facility.

**5.3.2.6.4 General Instruction Facility (Project 46090).** Under the Army's Proposed LU & FP (CH&I), approximately 55 acres (22 hectares) could be disturbed for new construction contained in the General Instruction Facility project. The construction would occur at the northern edge of the cantonment area. Approximately ten acres (4 hectares) of the disturbed area would lie in areas with steep slopes that would have a particular potential for soil erosion. The remaining 45 acres (18 hectares) would have a more moderate potential for soil erosion. The construction of the Chemical Administration facility (project site P-2) would result in a direct significant adverse impact to soil. Project sites P-7, P-8, P-16, P-19 and P-20 also have significant adverse impacts to soil. The amount of erosion will be minimized through the use of erosion controls. A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

**5.3.2.6.5 Applied Instruction Facility (Project 46091).** This construction package in the Army's Proposed LU & FP (CH&I) entails the construction of two facilities in the southwestern portion of the cantonment area as well as renovation of existing buildings. The renovations will not have an impact on soil erosion. The construction of the new facilities could disturb 41 acres (16 hectares). The disturbed areas have relatively gentle slopes. Soil erosion as a result of the construction will be relatively limited. The Chemical OSUT and the Military Police OSUT, project sites P-3 and P-4, respectively, will result in a direct adverse impact to soil.

**5.3.2.6.6 Unaccompanied Personnel Housing (Project 46092).** This construction, under the Army's Proposed LU & FP (CH&I), could disturb approximately 78 acres (31 hectares). Approximately 26 acres (10 hectares) would have steep slopes that would present a high potential for soil erosion. This will result in a direct significant adverse impact to soil. A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

**5.3.2.6.7 Range Modifications (Project 46094).** Under the Army's Proposed LU & FP (CH&I) a number of ranges would undergo modifications. This package includes modification to a number of existing ranges as well as the establishment of several new training areas. Approximately 775 acres (310 hectares) could be impacted as a part of this package. The package includes approximately 117 acres (47 hectares) with steep slopes and/or particularly erodible soil types that would result in a high potential for soil erosion. Specific projects included within this package that will cause adverse impacts to soils include:

- Construction of the Evasive Driving Course, which could disturb approximately 73 acres (29 hectares) with relatively low slopes;
- M-60/M240 Familiarization at Range 18 could disturb approximately 45 acres (18 hectares);
- Base Recovery, project site P-30, could disturb approximately 6 acres (2 hectares);
- Mobile smoke training at Ballard Hollow could disturb approximately 18 acres (7 hectares);
- Special Reaction Team Marksman/Observer, project site P-49 could disturb approximately 44 acres (18 hectares);
- Static Smoke Training, project site P-51, could disturb approximately 12 acres (5 hectares);
- Relocation of Range 29 could disturb approximately 15 acres (6 hectares);
- Relocation of Range 30 D/N could disturb approximately 22 acres (9 hectares); and

- Relocation of Range 30 F could disturb approximately 12 acres (5 hectares).

The following projects will cause direct significant adverse impacts to soils:

- Construction of the FFE deterrents training area, which could disturb approximately 85 acres (34 hectares) (28 (11 hectares) of which could have steep slopes);
- Mark 19 Familiarization and Qualification Range at Range 19 could disturb approximately 322 acres (129 hectares); and
- Mobile Smoke Training in the Bailey/McCann basin could disturb approximately 111 acres (44 hectares) (approximately 77 acres (31 hectares) of the project area has steep slopes).

Mitigation measures as described in subsection 5.5.1.2 will be used to minimize the soil erosion that occurs as a part of these construction projects. A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

**5.3.2.6.8 Convert Housing (Project 46640).** This construction package involves the renovation and reuse of existing structures. There could be no impact on soil erosion as a part of this package.

## 5.3.2.7 Infrastructure

The following issues related to the infrastructure systems at FLW have been identified with the implementation of the Army's Proposed LU & FP (CH&I).

- Availability and adequacy of existing utility service connections; and
- Energy usage, and
- Traffic volume and concentration.

### 5.3.2.7.1 Issue: *Availability and adequacy of existing utility service connections.*

As discussed in subsection 5.2.2.7, the system capacities of FLW utilities are adequate to serve the anticipated increase in population. New facilities, in previously undisturbed areas, will require that new utility service connections be extended to the sites. Increases in the utility requirements for specific areas on the installation may exceed the capacity of utility lines that currently service those areas. Therefore the estimated utility demand from new facilities must be considered for the impact they may have on existing lines. Under the Army Proposed LU & FP (CH&I), construction packages requiring extensive extension and upgrade of existing utilities include: the 16-Building MOUT Facility, the CDTF, Chemical and Military Police Instruction and Administration, and Unaccompanied Personnel Housing (Figure 3.3).

- **Direct Impact** The 16-Building MOUT facility (Project 45892) is located approximately 1.2 miles (1.9 kilometers) west of the Normandy Training Area. Electrical service would have to be extended from the Normandy Training Area to service the MOUT facilities. A short-term adverse impact would result associated with the construction required to extend this electrical service to the 16-Building MOUT.

  The CDTF (Project 45893) site is located approximately 1.5 miles (2.4 kilometers) west of the cantonment area. To provide water service in a looped system for fire fighting purposes, new distribution lines will be required from the southeast and from the southwest. The total length of the new 10-inch water distribution loop would be approximately 2.4 miles (3.8 kilometers). To connect the facility to the installation's sewer system would require approximately 2.5 miles (4 kilometers) of new gravity and force main sewers to connect the sewage system to that serving the cantonment area. Natural gas for heating and operation of the autoclave would require approximately 2.2 miles (3.5 kilometers) of a new service line from the cantonment area proceeding around the northern end of the airfield. New electrical service would require upgrading approximately 1.5 miles (2.4 kilometers) of existing lines and adding approximately 0.7 miles (1.1 kilometers) of new service lines. These actions would create a short-term adverse impact associated with construction of the CDTF.

Relocating the Military Police School and Chemical School Instruction and Administration facility (Project 49090) and the Unaccompanied Personnel Housing (Project 49092) to new facilities located north of Lincoln Hall would exceed the capacity of the existing electrical Substation No. 1. The upgrade to this substation can be provided by Sho-Me Power at no cost to the government. All other utilities needed to service these facilities are adequate. Therefore, no adverse impact is anticipated for construction of the Chemical and Military Police Instruction and Administration facility and the Unaccompanied Personnel Housing.

- **Indirect Impact** A short-term indirect impact would occur as a result of constructing the CDTF (Project 45893). A new lift station in the vicinity of the southwest end of the airfield would be required to convey sewage from the CDTF to the cantonment area where gravity flow sewer lines carry sewage to the FLW wastewater treatment plant.

**5.3.2.7.2 Issue: *Energy usage.*** The increase in effective population and the increase in the number facilities at FLW will result in an increase in the energy consumption by the installation. As described in subsection 5.2.2.7, the utility systems have the capacity to handle the increased demands of the added square footage.

- **Direct Impact** FLW currently has approximately 11.7 million square feet of facilities requiring heating and cooling. Under the Army's Proposed LU & FP (CH&I) approximately 800,000 square feet of new facilities will be constructed. To minimize the increase in energy demand, the new facilities and any existing facilities renovated will meet the energy standards of AR 11-27. Energy policies specific to FLW are contained in Supplement 1 to AR 11-27 (FLW, 1992a). New facilities would be required to adopt and abide by these same policies. Therefore, the increase in energy usage associated with the relocation of the Military Police School and Chemical School to FLW is not anticipated to have an adverse impact on the environment.

- **Indirect Impact** The Military Police School and Chemical School operate within facilities totalling approximately 1.6 million square feet at FMC. When relocated to the new facilities at FLW, the amount of square footage requiring electrical service, heating and cooling will be reduced by approximately 50 percent. In addition, the new facilities will be designed to current standards to conserve energy. Therefore, energy demand for the operation of the Military Police School and Chemical School will be reduced when they are relocated to FLW resulting in a long-term beneficial indirect impact.

**5.3.2.7.3 Issue: *Traffic Volume and Concentrations.*** Implementation of the proposed action will require the repair, expansion and modernization of several roads and road segments within the range and training areas. These repairs, expansions and modernization will be accomplished as part of additional maintenance as a part of the Range Modifications (Project 46094) construction project. Implementation of the Army's Proposed LU & FP (CH&I) will result in an increase of training and administrative functions in the northern end of the cantonment area near Lincoln Hall. This increase of activity will also concentrate automobile traffic in that area.

As described in subsection 4.7, MTMCTEA measured existing level-of-service for major intersections at FLW. Traffic projections were then prepared based on the post's population figures after the proposed action. Results of those projections appear in the following findings.

- **Direct Impacts.** Missouri Avenue weekday traffic will experience a long-term, adverse impact due to increasing volume from about 24,000 to 31,600 vehicles per day by the year 2000. This increase is due to the number of permanent party and civilian personnel who will live off-post. Some increase is also due to the number of retirees and dependents living in the area who are attracted to the community center activities. The intersection of Missouri and Headquarters Avenues will continue to be the most congested intersection.

Vehicle delays will increase for motorists who turn left from Indiana, Diamond and Pulaski Avenues because of the increase in traffic on Missouri Avenue. Vehicle delays will also become a problem at Gate Street Road for those who turn left and travel southbound on Missouri Avenue.

During the noon and evening peak hours there will be a large north-south traffic flow between the community center and the Engineer Center, Morelli Heights, General Instruction Facility and UPH. The Nebraska Avenue extension (as specified in the General Instruction Facility (Project 46090)) will be an excellent route for short north-south local trips in the cantonment area.

Turning movement counts at major intersections were projected for the year 2000 based on these new population figures and a projected increase in existing turning movement counts. Based on these new turning movement counts, level-of-service was projected for the major intersections.

A number of intersection improvements were recommended prior to the announcement of the proposed action. Other intersection improvements were recommended by MTMCTEA to alleviate the impacts of the traffic generated by the proposed action. The projected year 2000 level-of-service for the major intersections is listed in Table 5.42. Intersections not listed in Table 5.42 through 5.44 will function at level-of-service C or better during peak hours.

**Table 5.42:**
**2000 Level-of-Service (LOS) Without Improvements**

| Intersection | AM LOS | Noon LOS | PM LOS |
|---|---|---|---|
| Missouri Ave @ Headquarters Ave | F (79) | C | * |
| Missouri Ave @ Indiana Ave | F (86) | A | F (395) |
| Missouri Ave @ Pulaski Ave | * | B | F (90) |
| Missouri Ave @ Gate St | F (47) | B | * |
| Nebraska Ave (Morelli Hts) @ First St | * | F (90) | * |

Notes: (79) Numbers in parentheses indicate average seconds of delay per vehicle.
* Indicates that approach lanes at the intersection are over capacity.

*Source: Military Traffic Management Command Transportation, Transportation Engineering Agency, May 1996*

**Table 5.43:**
**2000 Level-of-Service (LOS) With Recommended Improvements**

| Intersection | Worst Peak Hour LOS |
|---|---|
| Missouri Ave @ Headquarters Ave | D (26) |
| Missouri Ave @ Indiana Ave | C |
| Missouri Ave @ Pulaski Ave | * |
| Missouri Ave @ Gate St | F (134) |
| Nebraska Ave (Morelli Hts) @ First St | B |

notes (79) Numbers in parentheses indicate average seconds of delay per vehicle.
* Indicates that approach lanes at the intersection are over capacity.

*Source: Military Traffic Management Command Transportation, Transportation Engineering Agency, May 1996*

**Table 5.44:**
**2000 Level-of-Service (LOS) With Recommended Improvements and Additional Signalization**

| Intersection | Worst Peak Hour LOS |
|---|---|
| Missouri Ave @ Headquarters Ave | D (26) |
| Missouri Ave @ Indiana Ave | C |
| Missouri Ave @ Pulaski Ave | C[1] |
| Missouri Ave @ Gate St | B[1] |
| Nebraska Ave (Morelli Hts) @ First St | B |

notes: (79) Numbers in parentheses indicate average seconds of delay per vehicle.
1 Includes Signalizing Intersection

*Source: Military Traffic Management Command Transportation, Transportation Engineering Agency, May 1996*

Intersection improvements that have been proposed for the installation, in order to alleviate the anticipated impacts associated with the proposed BRAC actions, are documented in the Military Traffic Management Command Transportation, Transportation Engineering Agency (MTMCTEA) report. These include improvements proposed prior to BRAC 95 actions, BRAC related improvements, and additional improvements proposed by the MTMCTEA to improve traffic flow. Specific roadway infrastructure improvements specified in the Army's Proposed Action include the:

1) realignment of Nebraska Avenue between First Street and Third Street, including the reconstruction of the intersection of Nebraska Avenue with Third Street, Headquarters Avenue, and First Street;

2) improved signalization of the intersection of the realigned Nebraska Avenue and First Street;

3) improvement of Gate Street north of Lincoln Hall and connection of Gate Street to the Engineer Center complex to allow for traffic flow between Missouri Avenue and the Engineer Center complex along Gate Street; and

4) the improvement of the Gate Street intersection with Missouri Avenue, including the construction of an additional right turn lane off of Gate Street.

With the implementation of all of these proposed improvements, the level-of-service would improve for the intersections with critical problems. The level-of-service that would result from these improvements is listed in Table 5.43. In addition to these improvements, the signalization of the intersections of Missouri Avenue and Pulaski Avenue, and Missouri Avenue and Gate Street would result in further improvements to the projected level-of-service. The resulting level-of-service for the signalization of these two intersections is indicated in Table 5.44. MTMCTEA has recommended that signalization of these two intersections only be done as a last resort.

Implementation of the proposed training actions will also require the repair, expansion and modernization of several roads and road segments within the range and training areas. These repairs, expansions and modernizations will be accomplished as part of additional maintenance as a part of the Range Modifications (Project 46094) construction project.

- **Indirect Impact.** The realignment of Nebraska Avenue and Gate Street, and the other associated improvements, will alleviate minor impacts on traffic flow associated with the increased development north of Lincoln Hall. The repair, expansion and modernization of roads and road segments near the ranges ad training areas will result in improved (routine and emergency) access to these areas. All of the roads and road segments near the range and training areas are designed for restricted access and are not used by through traffic, consequently the utility of the improved access will be limited.

## 5.3.2.8 Hazardous and Toxic Materials

Implementation of the Army's Proposed LU & FP (CH&I) will result in the following issues related to hazardous and toxic materials used at FLW.

- Use of hazardous materials during construction; and
- Construction on contaminated sites.

**5.3.2.8.1 Issue: *Use of Hazardous Materials During Construction.*** During the course of construction of the various construction packages proposed, contractors will likely use or generate materials having hazardous characteristics, such as paints, paint thinners, solvents, and sealing compounds. The contractor will be responsible for maintaining Material Safety Data Sheets for any such materials brought to FLW. The contractor will also be responsible for proper management and disposal of materials used or generated during the course of construction. If an uncontrolled release should occur, the contractor will contact the appropriate FLW authorities. Control and remediation of a release will, as a minimum, follow requirements of the FLW Spill Plan. Therefore, no adverse impact is anticipated as a result of contractors using hazardous materials during the course of construction activities.

**5.3.2.8.2 Issue: *Construction on Contaminated Sites.*** Sites for new facility construction projects were selected to avoid disturbance of any known contaminated sites requiring remediation through the Installation Restoration Program or the Installation Action Plan. In 1982 and 1987 the Army conducted assessments to locate and identify areas on the installation with the potential for hazardous substance contamination. These assessments were also used by USEPA in preparing a Facility Assessment in 1992 and by FLW in preparing the Installation Action Plan which identifies areas requiring remediation. These surveys area used during Installation Master Planning to avoid siting facilities in areas where contamination may exist. Types of sites identified as having the potential for contamination including Firefighting Training Areas, landfills, and hazardous waste temporary storage areas. Funding for remediation is programmed through the Army's Installation Restoration Program.

None of the BRAC 95 facilities area proposed for areas identified in the surveys as having the potential for contamination requiring remediation through the Installation Restoration Program. In April 1996, the FLW, Directorate of Public Works, Environmental, Energy, and Natural Resources Division completed a Preliminary Assessment Screening (PAS) of all sites proposed for utilization under the each of three alternative land use and facility plans (FLW, 1996i) as a final clearance check. The PAS **did not identify any sites** included in the Installation Action Plan or which require remediation through the Installation Restoration Program.

The PASs indicated that, because many of the sites specified use under this land use plan have been used for other uses in the past, the proposed construction sites may be a potential that oil products, munitions, asbestos or underground storage tanks may have been located at the area within the sites specified for reuse: however; none of these properties would qualify for the Installation Action Plan or the Installation Restoration Plan. Facilities at these sites that are known to contain asbestos (or asbestos containing materials) have been clearly marked. Normal procedures during construction should eliminate the potential for contamination from these sites. Sites and the potential contaminate include:

- BIDS & FOX Organizational Parking near TA250 (P-8) (which is part of the Applied Instruction Facility (Project 46091) construction project) which is located in area where oil products were used;
- Chemical OSUT (P-3) (which is part of the Applied Instruction Facility (Project 46091) construction project) which is located in area where oil products were used;
- Flame Field Expedient Deterrent Training Area at Range 27 (P-5) (which is part of the Range Modifications (Project 46094) construction project) which is located in area where munitions were used;

- FOX Vehicle Swim Area and Organizational Parking at TA250 (P-9) (which is part of the Range Modifications (Project 46094) construction project) which is located in area where oil products were used;
- Mark 19 Familiarization and Qualification at Range 19 (P-23) (which is part of the Range Modifications (Project 46094) construction project) which is located in area where munitions were used;
- FOX Familiarization at Range 18 (P-24) (which is part of the Range Modifications (Project 46094) construction project) which is located in area where munitions were used;
- Renovation of the UPH, Officer housing at Sturgis Heights (P-54) (which is part of the Convert Housing (Project 46640) construction project) which is located in area where facilities contained asbestos or asbestos containing materials;
- Soccer field relocation as require at the Unaccompanied Personnel Housing (which is part of the Unaccompanied Personnel Housing (Project 46091) construction project) which is located in area that includes where existing Buildings 2510 and 2516 on now located. These facilities were identified as containing asbestos containing materials and lead based paint containing materials (Woodward-Clyde, 1996);
- Military Police OSUT (P-4) (which is part of the Applied Instruction Facility (Project 46091) construction project) which is located in area where facilities contained asbestos or asbestos containing materials; and
- Warehouse Storage by renovating buildings 2310 and 2311 (P-58) (which is part of the Applied Instruction Facility (Project 46091) construction project) which is located in area where facilities contained asbestos or asbestos containing materials.

The construction contractor would be made aware of the prior use of these sites. Precautions would be required by the contractor to prevent contamination if disturbance of these areas is necessary. FLW currently has well defined ongoing programs to monitor and remove USTs and asbestos containing material. The proposed construction projects will expedite removal of USTs and asbestos containing material. Therefore, a short-term beneficial impact would result from the earlier removal of the USTs and asbestos containing material.

## 5.3.2.9 Munitions

The following issues related to the Munitions at FLW have been identified with the implementation of the Army's Proposed LU & FP (CH&I).

- Quantity of munitions used; and
- Creation of new range impact and dud areas.

**5.3.2.9.1 Issue: *Quantity of Munitions Used.*** Implementation of the Army Proposed LU & FP (CH&I) is not anticipated to have an impact associated with munitions used at or brought to FLW. Munitions will be discharged on ranges designated for their use. As described in subsection 5.3.2.2, the Range Modification project sites will be located within areas designated for such Training. Potential impacts due to noise from munitions are described in subsection 5.3.2.4.

**5.3.2.9.2 Issue: *Creation of New Range Impact and Dud Areas.*** Implementation of the Army Proposed LU & FP (CH&I) will result in the reallocation of various range and training areas. Upon completion of the reallocation, several existing live-fire range areas (ranges 29, 30F and 30 Day/Night) will be relocated from the western side of FLW 1 to the eastern side of FLW 1. Additionally all new Mark 19 training with high explosives will be located at Range 19, which has an existing area designated as a dud area.

- **Direct Impact.** Relocation of several live-fire ranges west of FLW 1 to the eastern side of FLW will allow for the elimination of the established range safety fans and impacts areas associated with these ranges. This will allow for the area to safely be used for other training requirements.

Collocation of the Mark 19 training with high explosives to Range 19 will allow for the use of the existing designated dud area at Range 19 for training with high-explosive rounds, eliminating a need to have EOD personnel standing by at the range during training.

- **Indirect Impacts.** By not requiring EOD personnel to stand-by during training, the long-term costs associated with Mark 19 training will be reduced when compared to Alternative 1 LU & FP (Combined Headquarters) as discussed in subsection 5.3.3.9.2.

## 5.3.2.10 Permits and Regulatory Authority

Fort Leonard Wood operates in compliance with all federal, state and local laws and regulations. Environmental permits have been issued to FLW for the activities identified in subsection 4.10. The actions associated with the implementation of the proposed BRAC training goals would raise concern over the impact on compliance with existing permits and licenses and the potential need for modifications or new permits or licenses.

The primary focus of concern with respect to Permits and Regulatory Authority will be with the conditions and limitations contained within the permits and licenses which will be issued for implementation of the BRAC action. These conditions and limits will be used by the regulatory authorities and FLW to manage the activities in such a manner as to minimize threats to public health and mitigate potential impacts on the environment to levels that are deemed acceptable under the permitting process. The conditions and limits will be defined during the acquisition of each permit/license in accordance with the application process established in the regulations.

FLW has obtained several of the required permits for implementing the BRAC action and will obtain the remaining permits prior to initiating each regulated activity. Subsection 5.2 identifies the regulatory and permitting issues and the impacts of the training methods to be implemented as part of the BRAC Action. The permits/licenses in subsection 5.2 will be acquired prior to starting construction of the regulated facilities. Implementation of the BRAC Action and the associated construction has created concern over the following issues with respect to Permits and Regulatory Authority.

- Land disturbance storm water permits; and
- Stream encroachment permits

**5.3.2.10.1 Issue: *Land Disturbance Storm Water Permits.*** The construction activities associated with the implementation of the Army's Proposed LU & FP (CH&I) Alternative will comply with the Water Pollution Control Program of the MDNR Clean Water Commission. FLW will acquire a General State Operating Permit to Discharge storm water from land disturbance activities for construction sites impacting over five acres. The permit would be issued in compliance with the Missouri Clean Water Law (Chapter 644 R.S. as amended) and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress). These permits for sites that disturb over five acres of land in a common plan are routinely acquired in accordance with MDNR regulations 10 CSR 20-6.200 for construction projects at FLW. In general these permits are issued to implement the statewide storm water management program and reduce the need for an individual NPDES permit for each action.

- **Direct Impacts.** The Army's Proposed LU & FP (CH&I) Alternative would require manpower for acquisition of these permits prior to the construction phase of the facilities. This direct adverse impact would be short term since the permits are terminated when all areas covered by the permit have been stabilized and construction is complete. Facility construction involving conversion, renovation, and/or reconstruction with limited land disturbance would not need to comply with permit acquisition and therefore would not have an impact from the regulatory perspective. Under the Army's Proposed LU & FP (CH&I) Alternative, the facility packages with anticipated land disturbance of more than five acres are as follows:

    - 16-Building Military Operations in Urbanized Terrain Facility (Project 45892);

- Chemical Defense Training Facility (Project 45893);
- General Instruction Facility (Project 46090);
- Applied Instruction Facility (Project 46091);
- Unaccompanied Personnel Housing (Project 46092); and
- Range Modifications (Project 46094).

- **Indirect Impacts.** Under the Army's Proposed LU & FP (CH&I) Alternative the acquisition of land disturbance storm water permits requires implementation of short term manpower requirements for activities associated with operating, monitoring, record keeping, reporting and implementing precautions as required by the permits. These are indirect adverse impacts from a commitment or resources perspective but have a benefit of protecting human health and the environment.

**5.3.2.10.2 Issue: *Stream Encroachment Permits.*** The construction activities associated with the implementation of the Army's Proposed LU & FP (CH&I) Alternative will comply with the provisions for protection of navigable waters as provided by Section 404 of the CWA (33 U.S.C. 1344) (hereinafter referred to as Section 404 ). Construction activities involving, encroaching on, dredging or filling the waters of the United States require a review and potentially, the issuance of a Section 404 permitting process. Regulations encoded in 33 CFR Parts 320 through 330 provide policies, practices, and procedures to be followed by the Corps of Engineers in connection with the review of applications for permits to authorize the discharge of dredged or fill material into waters of the United States pursuant to Section 404. A Nationwide permit (NWP) refers to a type of general permit which authorizes activities on a nationwide basis unless specifically limited. Construction activities such as road crossings can regulated under the NWP if approved by the Corps of Engineers. In general, the NWP was issued to reduce the need for an individual Section 404 permits for each action.

- **Direct Impacts.** Implementation of the Army's Proposed LU & FP (CH&I) Alternative would require a review of compliance with NWP prior to the construction phase of the range road stream crossings and facilities near wetlands and stream banks. This direct adverse impact would be short term since application of the NWP is associated with construction and stabilization of the impacted area. Facility construction involving conversion, renovation, reconstruction and construction in areas without impact on stream banks at the high water level would not need to comply with permit acquisition and therefore would not have an impact from the regulatory perspective. The facilities with anticipated areas of stream or wetland encroachment are as follows:

    - Chemical Defense Training Facility (Project 45893); and
    - Range Modifications (Project 46094).

- **Indirect Impacts.** Under the Army's Proposed LU & FP (CH&I) Alternative the acquisition of compliance with the NWP and Section 404 provisions requires implementation of short term manpower requirements for activities associated with operating, monitoring, record keeping, reporting and implementing precautions as required by the permits. These are indirect adverse impacts from the perspective of commitment of resources.

## 5.3.2.11 Biological Resources

The analysis of Biological Resources has been divided into sections for:

- Federal Threatened and Endangered Species (as discussed in 5.3.2.11.A);
- Other Protected Species (as discussed in 5.3.2.11.B);
- Wetlands (as discussed in 5.3.2.11.C);
- Aquatic Resources (as discussed in 5.3.2.11.D); and
- Terrestrial Resources (as discussed in 5.3.2.11.E).

## 5.3.2.11.A Federal Threatened and Endangered Species

BRAC-related land use and facilities construction activities will result in modification of habitat suitable for use by T & E species. There is no designated critical habitat on FLW. The three Land Use and Facility Plan Alternatives include construction and modification of buildings, training ranges, and support facilities. Implementation of BRAC facilities construction objectives associated with these alternatives will result in limited degradation or destruction of summer habitat of Indiana and gray bats.

**Project design features.** Project design features will beneficially affect the quality of Indiana and gray bat habitat through development and implementation of a landscape-scale forest management policy. In addition, an Endangered Species Management Plan (ESMP) will be designed and implemented by the Installation. The ESMP will specify measures to balance conservation of bald eagles, Indiana bats, and gray bats, and mission requirements. A primary goal of the ESMP will be to specify a well-designed, integrated approach to endangered species management at FLW. The ESMP will ensure compliance with the Endangered Species Act (ESA).

Rationale and methodology for effects analyses and project design features are described in the BRAC BA (FLW, 1997). Evaluation of effects of BRAC action land use and facilities construction alternatives to T & E species were based upon the following:

- **Bald eagles.** Bald eagles have been observed on FLW only during the winter. Wintering eagles sightings are concentrated (10 or more sightings) in three areas within a 1.2 mile stretch of either Roubidoux Creek or the Big Piney River (FLW, 1996e). To determine effects of the proposed BRAC action on bald eagles, suitable habitat for this species was identified along portions of Roubidoux Creek or the Big Piney River (FLW, 1997). Effects of land use and facilities construction-related activities proposed under BRAC action alternatives were investigated for effects to bald eagles within suitable habitat on the Installation (FLW, 1997). Results of this analysis indicate BRAC-related construction activities will not directly affect bald eagles. Two proposed construction sites are within bald eagle use areas, but are screened from eagle view by intervening riparian vegetation, and thus should have no effect on wintering bald eagles (FLW, 1997).

  To avoid potential indirect effects to bald eagles (via degraded water quality and resultant decrease in prey availability), erosion control measures implemented during proposed construction will minimize movement of sediment towards streams utilized by this species and their prey (Section 5.4.6; FLW, 1997).

- **Indiana bats.** Project design features (FLW, 1996e) restrict activities near hibernacula, and preclude effects of BRAC-related activities to Indiana bats hibernating in Davis No.2, Joy, Brooks, and Wolf Den caves. If tree clearing activities were not restricted to the period when Indiana bats are not present in summer foraging/roosting habitat (15 September to 15 April), proposed construction could potentially affect directly (via take) Indiana bats roosting in trees affected by construction (FLW, 1997). In addition, proposed construction activities may affect Indiana bats through impacts to habitat.

  Effects to habitat suitable for summer foraging and roosting male, female, and juvenile Indiana bats were assessed. Quality and quantity of habitat at proposed construction sites were characterized and evaluated to determine suitability for use by Indiana bats. Area and suitability of affected habitat at each site proposed for construction was determined in the field. Habitat was ranked as high, moderate, or low in suitability. Optimal Indiana bat summer habitat consists of forested areas that provide high quality foraging and roosting sites and a permanent source of water within 0.6 mile (1 kilometer). High quality foraging areas are generally mature forests with large overstory trees (greater than 15 inches (40 cm) diameter breast height), a high percent overstory canopy closure (50 percent - 80 percent), and an open subcanopy (less than 30 percent canopy closure). High quality roosting habitat consists of similar forested areas with the addition

of suitable roost trees. Suitable roost trees are live or dead trees with exfoliating bark or hollows. Large diameter trees with greater than 25 percent of the bark exfoliating provide the highest quality roost sites. High quality habitat consists of greater than 5 suitable roost trees per acre.

Based upon these criteria, forested portions of the proposed facilities construction sites were qualitatively ranked as providing high, moderate, or low quality summer habitat for Indiana bats. Roosting habitat and foraging habitat were initially evaluated separately within each forested area, and then combined in an overall quality rating. The overall habitat quality is limited by the lower of the values for roost and foraging habitat. Forest at proposed construction sites provides suitable foraging habitat, but quality of roosting habitat at most sites limits overall habitat suitability.

For all of the Land Use and Facility Plan Alternatives, proposed facilities construction will affect habitat suitable for summer roosting and foraging Indiana bats, and therefore may adversely effect this species. Table 5.45 gives the area of suitable summer habitat affected by each Land Use and Facility Plan Alternative.

- **Gray bats.** Project design features (FLW, 1996e; and FLW, 1997) restrict activities near roost caves, thereby precluding effects of BRAC-related activities to gray bats in Saltpeter No.3 and Freeman caves.

  Effects to habitat suitable for summer foraging male, female, and juvenile gray bats were assessed. Quality and quantity of habitat at proposed construction sites within 531 feet (159 meters) of gray bat maternity caves, between maternity caves and nearby riparian areas, and within 100 feet (30 meters) of streams where gray bats were captured on the Installation.

  Forest removal along streams resulting from proposed construction may reduce gray bat foraging habitat quality via changes in canopy closure along stream corridors although proposed impacts are limited in area and effects are likely to be minimal. Construction along previously cleared streams is unlikely to alter gray bat foraging habitat quality.

**Table 5.45:**
**Area of Indiana Bat Summer Habitat Affected by Each Land Use and Facility Plan Alternative**

| Land Use Facility Plan Alternative | No. Acres of High Quality Indiana Bat Habitat to be Removed | No. Acres of Moderate Quality Indiana Bat Habitat to be Removed | No. Acres of Low Quality Indiana Bat Habitat to be Removed |
|---|---|---|---|
| Army's Proposed LU & FP (CH&I) | 0 | 150.5 | 27.5 |
| Alternative 1 LU & FP (CH) | 0 | 23.4 | 272.2 |
| Alternative 2 LU & FP (SH) | 0 | 109.0 | 136.7 |

*Source: 3D/Environmental*

Area of lost suitable gray bat habitat is lower for the Army's Proposed LU & FP (CH&I) (2.7 acres (1 hectare)) than for Alternative 1 LU & FP (CH) (7.3 acres), or Alternative 2 LU & FP (SH) (4.7 acres (2 hectares)). Table 5.46 provides a summary of the adverse effects of BRAC-related Land Use and Facility Plan construction activities on T & E Species, for each training alternative in association with each land use and facility plan. The BRAC facility locator numbers relate each support project to Figures 3.2 through 3.7 and Table 3.2 (that are located in Section 3, Description of Alternative - Including the Proposed Action) which have been included to illustrate the general location of all projects under each development alternative. Only those sites that are anticipated to have an impact on T & E Species are listed.

Potential adverse effects of BRAC-related land use and facilities construction activities on T & E species, for each Training Alternative in association with each land use and facility plan are summarized in Table 5.47. Adverse effects result from degradation of summer bat habitat.

Area and quality of habitat affected by BRAC-related land use and facilities construction activities, for each Training Alternative in association with each Land Use/Facility Plan are summarized in Table 5.47. Number of acres of forested habitat to be removed per facilities categories are given. Acreage is totaled in the shaded rows for the 8 facility categories. (IB = Indiana bat, GB = gray bat). Quality of affected Indiana bat habitat is indicated Low (L), Moderate (M), or High (H). The BRAC facility locator numbers relate each support project to Figures 3.2 through 3.7 and Table 3.2 which have been included to illustrate the general location of all projects under each development alternative. Only those sites that are anticipated to have an impact on T & E species are listed.

**Table 5.46:**
**Adverse Effects of BRAC-Related Land Use and Facility Plan Construction on T & E Species**

| **Construction Project Package**/Facility | **Army's Proposed LU & FP (CH&I)** | | | **Alternative 1 LU & FP (CH)** | | | **Alternative 2 LU & FP (SH)** | | |
|---|---|---|---|---|---|---|---|---|---|
| | IB | GB | BE | IB | GB | BE | IB | GB | BE |
| **1.0 General Officers Quarters (Project 38174)** | E | | | E | | | E | | |
| General Officers Quarters (site 45) | • | | | • | | | • | | |
| **2.0 16-Building MOUT (Project 45892)** | E | | | E | E | | E | | |
| 16-Building MOUT (site 7) | • | | | • | • | | • | | |
| **3.0 Chemical Defense Training Facility (Project 45893)** | E | | | E | | | E | E | |
| CDTF (site 10) | • | | | • | | | • | • | |
| **4.0 General Instruction Facility (Project 46090)** | | | | | | | E | | |
| Administration Facility (site 41) | | | | | | | • | | |
| Administration MP (site 42) | | | | | | | • | | |
| Officer Instruction (site 1) | | | | | | | • | | |
| **5.0 Applied Instruction Facility (Project 46091)** | E | E | | E | E | | E | E | |
| BIDS & FOX Maintenance (site 8) | | | | • | | | | | |
| BIDS & FOX Organization Parking (site 56) | | | | • | • | | • | • | |
| Chemical OSUT (DATF) (site 3) | • | | | • | | | | | |
| MP OSUT (MP Village) (site 4) | • | • | | | | | • | | |
| Warehouse Storage (site 58) | | | | • | | | | | |
| **6.0 Unaccompanied Personnel Housing (Project 46092)** | E | | | E | | | E | | |
| UPH, E new construction (site 46) | • | | | • | | | • | | |
| Soil Disposal Area (site 46) | • | | | • | | | • | | |
| **7.0 Range Modifications (Project 46094)** | E | E | | E | E | | E | E | |
| 9 mm Familiarization/Qualification (site 35) | • | | | | | | | | |
| 9 mm Fire Arms Training Sim. (site 34) | | | | • | | | | | |
| Combat Pistol (site 36) | • | | | | | | | | |
| Evasive Driving (site 38) | • | | | • | | | • | | |

**Table 5.46:**
**Adverse Effects of BRAC-Related Land Use and Facility Plan Construction on T & E Species**

| Construction Project Package/Facility | Army's Proposed LU & FP (CH&I) | | | Alternative 1 LU & FP (CH) | | | Alternative 2 LU & FP (SH) | | |
|---|---|---|---|---|---|---|---|---|---|
| | IB | GB | BE | IB | GB | BE | IB | GB | BE |
| FFE Deterrents Training Area (site 5) | • | | | • | | | • | | |
| FOX Vehicle Swim & Park (site 9) | | | | • | • | | • | • | |
| HMMWV Driving (site 37) | | | | • | | | • | | |
| M60/M240 Familiarization and Qualification Range (site 20) | | | | | | | • | | |
| Mark 19 Familiarization and Qualification (site 23) | • | | | • | • | | • | | |
| Mobile Smoke - Ballard | • | | | • | | | | | |
| Mobile Smoke - Musgrave | • | | | • | | | • | | |
| Mobile Smoke - Cannon Range (Mush Paddle Hollow) | | | | | | | | | |
| Mobile Smoke - Babb Airfield | | | | | | | | | |
| Mobile Smoke - Wolf Hollow | | | | • | | | • | | |
| Mobile Smoke - Bailey/McCann | • | • | | | | | • | • | |
| NBC Training Area (site 6) | • | | | • | • | | • | | |
| Shotgun (site 22) | • | | | | | | | | |
| Special Reaction Team Fam (site 26) | | | | • | | | • | | |
| Static Smoke (site 12) | • | | | | | | | | |
| Vehicle Maint Non-Cantonment (site 38) | • | | | • | | | • | | |
| Vehicle Parking Non-Cantonment (site 38) | • | | | • | | | • | | |
| Range Classroom Addition (site 28) | • | | | • | | | • | | |
| **8.0 Convert Housing (Project 46640)** | E | | | | | | E | | |
| UOPH new construction (site 53) | | | | • | | | • | | |

notes: • indicates an effect from establishing a specific facility
E indicates a summarized effect for the 8 facility construction project package
IB Indiana bat
GB gray bat
BE bald eagle

*Source: 3D/Environmental*

**Table 5.47:**
**Area and Quality of Bat Habitat Affected by BRAC-Related Land Use and Facility Plan Construction Activities**

| Construction Project Package/Facility | Army's Proposed LU & FP (CH&I) | | Alternative 1 LU & FP (CH) | | Alternative 2 LU & FP (SH) | |
|---|---|---|---|---|---|---|
| | IB | GB | IB | GB | IB | GB |
| **1.0 General Officers Quarters (Project 38174)** | 1.4 M | | 1.4 M | | 1.4 M | |
| General Officers Quarters (site 45) | 1.4 M | | 1.4 M | | 1.4 M | |
| **2.0 16-Building MOUT (Project 45892)** | 0.8 M<br>3.2 L | | 7.5 M | 2.3 | 0.8 M<br>3.2 L | |

**Table 5.47:**
**Area and Quality of Bat Habitat Affected by BRAC-Related Land Use and Facility Plan Construction Activities**

| Construction Project Package/Facility | Army's Proposed LU & FP (CH&I) | | Alternative 1 LU & FP (CH) | | Alternative 2 LU & FP (SH) | |
|---|---|---|---|---|---|---|
| | IB | GB | IB | GB | IB | GB |
| 16-Building MOUT (site 7) | 0.8 M<br>3.2 L | | 7.5 M | 2.3 | 0.8 M<br>3.2 L | |
| **3.0 Chemical Defense Training Facility (Project 45893)** | 19.7 M<br>2.5 L | | 2.3 L | | 21.0 L | 3.8 |
| CDTF (site 10) | 19.7 M<br>2.5 L | | 2.3 L | | 21.0 L | 3.8 |
| **4.0 General Instruction Facility (Project 46090)** | | | | | 4.1 L | |
| Administration, Chemical (site 41) | | | | | 1.3 L | |
| Administration Military Police (site 42) | | | | | 2.8 L | |
| Officer Instruction (site 1/1A) | | | | | see above | |
| **5.0 Applied Instruction Facility (Project 46091)** | 10.5 M | 2.3 | 5.2 L<br>6.4 L | 0.3 | 14.0 L | 0.5 |
| BIDS & FOX Maintenance (site 56) | | | same as Chem OSUT | | | |
| BIDS & FOX Organization Parking (site 56) | | | 0.2 L | 0.2 | 0.5 L | 0.5 |
| Chemical OSUT (DATF) (site 45) | 3.0 M | | 5.2 M<br>1.7 L | | | |
| MP OSUT (MP Village) (site 4) | 7.5 M | 2.3 | | | 13.5 L | |
| Warehouse Storage (site 58) | | | 4.5 L | | | |
| **6.0 Unaccompanied Personnel Housing (Project 46092)** | 4.2 M<br>1.0 L | | 2.8 M<br>4.2 L | | 2.8 M<br>1.4 L | |
| UEPH new construction (site 46/46A) | 1.4 M<br>1.0 L | | 4.2 L | | 1.4 L | |
| Soil Disposal Area (site 46) | 2.8 M | | 2.8 M | | 2.8 M | |
| **7.0 Range Modifications (Project 49094)** | 0 H<br>114.3 M<br>20.4 L | 0.4 | 0 H<br>6.5 M<br>239.8 L | 4.8 | 0 H<br>104.0 M<br>83.0 L | 0.4 |
| 9 mm Familiarization and Qualification (site 35) | 0.1 L | | | | | |
| 9 mm Fire Arms Training Simulator (site 34) | | | 0.1 L | | | |
| Marine Combat Pistol (site 36) | same as 9 mm Fam & Qual | | | | | |
| Evasive Driving (site 38) | 5.0 M | | 6.0 L | | 6.0 L | |
| FFE Deterrents Training Area (site 5) | 4.3 M | | 5.5 M<br>2.6 L | | 23.0 L | |
| FOX Vehicle Swim & Park (site 9) | | | same as BIDS & FOX Parking | same as BIDS & FOX Parking | same as BIDS & FOX Parking | same as BIDS & FOX Parking |
| HMMWV Driving (site 37) | | | 5.0 L | | 5.0 L | |
| Mark 19 Familiarization and Qualification Range (site 23) | 100.0 M<br>15.0 L | | 190.4 L | 4.5 | 100.0 M<br>15.0 L | |
| M60/M240 Familiarization and Qualification Range (site 20) | | | | | 0.2 L | |

**Table 5.47:**
**Area and Quality of Bat Habitat Affected by BRAC-Related Land Use and Facility Plan Construction Activities**

| Construction Project Package/Facility | Army's Proposed LU & FP (CH&I) | | Alternative 1 LU & FP (CH) | | Alternative 2 LU & FP (SH) | |
|---|---|---|---|---|---|---|
| | IB | GB | IB | GB | IB | GB |
| Mobile Smoke - Ballard | 1.0 M<br>0.4 L | | 1.0 M<br>0.4 L | | | |
| Mobile Smoke - Musgrave | 0.4 L | | 0.4 L | | 0.4 L | |
| Mobile Smoke - Wolf Hollow | | | 2.0 L | | 2.5 L | |
| Mobile Smoke - Bailey/McCann | 4.0 M<br>2.3 L | 0.4 | | | 4.0 M<br>2.3 L | 0.4 |
| NBC Training Area (site 21) | 0.5 L | | 0.5 L | 0.25 | 1.2 L | |
| Marine Shotgun (site 22) | same as 9 mm Fam & Qual | | | | | |
| Special Reaction Team (site 26) | | | 31.0 L | | 31.0 L | |
| Static Smoke (site 12) | 0.25 L | | | | | |
| Vehicle Maint Non-cantonment (site 38) | same as Evasive Driving | | same as Evasive Driving | | same as Evasive Driving | |
| Vehicle Parking Non-Cantonment (site 38) | same as Evasive Driving | | same as Evasive Driving | | same as Evasive Driving | |
| Range Classroom Addition (site 28) | 1.4 L | | 1.4 L | | 1.4 L | |
| **8.0 Convert Housing (Project 46640)** | | | 19.0 L | | 5.0 L | |
| UOPH new construction (site 53) | | | 19.0 L | | 5.0 L | |
| TOTAL ACRES | 0 H<br>150.5 M<br>27.5 L | 2.7 | 0 H<br>23.4 M<br>272.2 L | 7.3 | 0 H<br>190.0 M<br>136.7 L | 4.7 |

*Source: 3D/Environmental*

Adverse effects to T & E species associated with implementing construction of specific facilities packages for the CH & I Alternative are described below. Effects to Indiana and gray bats are identified below. There are no effects to bald eagles from construction of the proposed facilities packages. Effects related to construction of specific facilities within the facilities construction package are identified. For construction of other facilities within the construction facility, no effect is anticipated.

### 5.3.2.11.A.1 General Officers Quarters (Project 38174)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 1.4 acres (0.6 hectare) of moderately suitable summer Indiana bat habitat will be removed for construction of the General Officers Quarters.
- **Gray Bat.** No effect.

#### 5.3.2.11.A.2 16-Building MOUT (Project 45892)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 3.2 acres (1.3 hectares) of low suitability habitat, and 0.8 acres (0.3 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the 16-Building MOUT.
- **Gray Bat.** No effect.

#### 5.3.2.11.A.3 Chemical Defense Training Facility (Project 45893)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 2.5 acres (1 hectare) of low suitability habitat, and 19.7 acres (8 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the CDTF.
- **Gray Bat.** No effect.

#### 5.3.2.11.A.4 General Instruction Facility (Project 46090)

- **Bald Eagle.** No effect.
- **Indiana Bat.** No effect.
- **Gray Bat.** No effect.

#### 5.3.2.11.A.5 Applied Instruction Facilities (Project 46091)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 3.0 acres (1 hectare) of moderately suitable summer Indiana bat habitat will be removed for construction of the Chemical OSUT. An additional 7.5 acres (3 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the MP OSUT.
- **Gray Bat.** Approximately 2.3 acres (1 hectares) of suitable habitat will be removed for construction of the MP OSUT. Construction will clear > 100 feet ((30 meters) wide section of forest along 984 feet (295 meters) along the north side of Pond Hollow Creek. This intermittent creek provides a suitable flight corridor, and gray bats were captured approximately 2.5 miles (4 kilometers) downstream of this site.

#### 5.3.2.11.A.6 Unaccompanied Personnel Housing (Project 46092)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 1.0 acre (.4 hectares) of low suitability habitat, and 1.4 acres (.6 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of new UPH Enlisted facilities. An additional 2.8 acres (1.1 hectares) of moderately suitable habitat will be removed for a soil disposal area.
- **Gray Bat.** No effect.

#### 5.3.2.11.A.7 Range Modification (Project 46094)

- **Bald Eagle.** No effect.

- **Indiana Bat.** Approximately 0.1 acres (.04 hectares) of low suitability will be removed for construction of the 9 mm Familiarization and Qualification Range, Combat Pistol Range, and Shotgun Range. Approximately 5.0 acres (2 hectares) of moderately suitable habitat will be removed for construction of the Evasive Driving, Vehicle Maintenance - Non-Cantonment, and Vehicle Parking - Non-Cantonment Training Facilities. About 4.3 acres (2 hectares) of moderately suitable habitat will be removed for construction of the Flame Range. Approximately 0.5 acres (0.2 hectares) of low suitability will be removed for construction of the NBC Training Range. About 1.4 acres (0.6 hectares) of low suitability habitat will be removed for the range support classroom facility.

  Approximately 0.4 acres (0.2 hectares) of low suitability habitat, and 1.0 acres (0.4 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the Mobile Smoke Training Range at Ballard Hollow. An additional approximately 2.3 acres (1 hectares) of low suitability habitat, and 4.0 acres (2 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the Mobile Smoke Training Range at Bailey/McCann Hollow. About 0.4 acres (0.2 hectares) of low suitability will be removed for construction of the Mobile Smoke Training Range at Musgrave Hollow. Approximately 0.2 acres (.08 hectares) of low suitability suitable summer Indiana bat habitat will be removed for construction of the Static Smoke Training Range.

  Approximately 100.0 acres (40.5 hectares) of moderately suitable habitat and 15.0 acres (6.1 hectares) of low suitability habitat will be removed for construction of the Mark 19 Familiarization and Qualification Range.

- **Gray Bat.** Approximately 0.4 acres (0.2 hectares) of suitable gray bat habitat will be removed for construction of the Mobile Smoke Training Range at Bailey/McCann Hollow. Construction will clear 0.4 acres riparian forest within 100 feet (30 meters) along both sides of the intermittent Bailey Hollow Creek. Gray bats were captured approximately 0.9 miles (1.4 kilometers) downstream of this site.

#### 5.3.2.11.A.8 Convert Housing (Project 46640)

- **Bald Eagle.** No effect.

- **Indiana Bat.** No effect.

- **Gray Bat.** No effect.

## 5.3.2.11.B Other Protected Species

Other protected species (OPS) include state-listed species of birds, mammals, and amphibians as well as migratory birds including NTMs, raptors, and shorebirds. No density estimates for individual species populations are available for FLW. Since the other protected species resource group includes neotropical migrants, raptors, and other state-listed species, it would be cost prohibitive to try conduct the exhaustive surveys necessary to assess the populations for each potentially affected species. Consequently, it was assumed that the species populations are evenly distributed across the installation. This assumption is consistent with the same assumption used in the Ecological Risk Assessment (COE KC, 1997b).

In the Army's Proposed LU & FP (CH&I) there will be approximately 983 acres (393 hectares) of the FLW installation impacted by the various BRAC construction activities, which is less than 1.6 percent of the total installation acreage. Although 983 acres could be impacted during construction, the actual acreage to be

directly impacted will be substantially less. Approximately 70 percent of the 983 acres is currently covered with vegetation such as trees, brush, or grasses, and the remaining 30 percent of the project acreage is currently developed or improved. Typical developed lands consist of roads, parking lots, buildings, improved training ranges, or other disturbed areas.

- **Direct Impacts.** The primary direct impacts to OPS will occur through the disturbance from construction noise and the increased presence of people and machinery which is considered an annoyance to some OPS. Increased noise levels and the increased presence of people and equipment on training areas and ranges could disturb resident wildlife and cause areas to be temporally abandoned which may increase stress levels. These types of disturbance to resident wildlife species could also inhibit mating, breeding, nesting, and feeding/foraging behavior. Other potential direct impacts may include the destruction of nests during clearing and grading, respiratory stress through increased vehicle emissions and dust, and the physical mortality from vehicle collisions.

  Noise and dust generated by construction activities could cause minor adverse impacts. The disturbance from construction noise and the increased presence of people and machinery would be considered an annoyance to OPS, however these potential impacts are not likely to alter OPS population levels.

- **Indirect Impacts.** Construction of new facilities, ranges, or training areas may cause indirect adverse impacts to OPS. The removal of vegetation, dirt work, and creation of impervious surfaces such as parking lots or buildings, during construction operations may lead to increased runoff and subsequent erosion. The increased runoff may contain sediment, contaminants, and other construction related debris. Sediment loading in streams may increase turbidity and affect other water quality parameters such as dissolved oxygen, pH, conductivity, and heavy metal concentrations. Other Protected Species that use aquatic habitat, especially sedentary species, are often adversely impacted by degraded water quality. High turbidity from eroded sediments can decrease plankton production, interfere with the uptake of oxygen, and cause mortality in some species that are sensitive to water quality. Stressed species are more susceptible to disease and parasites. Through the use of proper construction techniques and BMPs most adverse impacts to aquatic species can be minimized or eliminated. A detailed list of BMPs related to construction management, soil stabilization, runoff control, and stream erosion and sediment control are described in subsection 5.5.1.2. Other possible impacts to aquatic species are discussed in subsection 5.3.2.11.D.

  Construction sites are often exposed to vehicle and equipment contaminants. Leaks of oil, fuel, grease, hydraulic fluid, brake fluid, antifreeze, and other substances can be transported through surface water runoff. Some construction related materials have the potential to stress or cause mortality in OPS habitat. Restricting the movement of construction equipment, especially at intermittent stream crossings, in wet weather conditions will also reduce potential adverse impacts to OPS habitat.

  The most important long-term impacts to OPS will be from the loss/conversion of habitat, degradation of habitat, and increased fragmentation of forested areas. Presently some forested areas will be cleared during some of the construction activities, and these areas may be fully developed, partially developed, or converted to other marginal quality habitats. For example, during a range construction project new buildings, parking lots, and roads would be considered fully developed, cleared firing lanes that are seeded with grass would be considered partially developed or converted to lower quality habitat. Forest fragmentation is a serious problem for NTMs that are forest interior species. Typically, forest interior species require large blocks of mature or even age timber, and the various species often stratify in their preferred nesting habitats. The vertical component of some nesting NTMs is often overlooked and these species can be susceptible to disturbance. Fragmentation can cause adverse impacts to OPS by allowing edge-dwelling nest parasites, such as the brown-headed cowbird, or predators easier access to

nesting sites. It is postulated that nest depredation and the loss of suitable habitat are two of the primary factors contributing to the declining populations of NTMs in North America.

There will not be any intrusion or disturbance of any single block of undisturbed forested area greater than 500 acres (200 hectares), which has been noted as a minimum size of forest needed in the Midwest to maximize benefits for the less sensitive forest interior neotropical migrant birds. Because of the existing extensive systems of roads, trails and fire breaks, there are no existing blocks of forested areas that meet the 500-acre minimum.

**5.3.2.11.B.1 General Officers Quarters (Project 38174).** There will be no direct or indirect adverse impacts to OPS as a result of constructing the General Officers Quarters (Project 38174) under the Army's Proposed LU & FP (CH&I). Only 2 acres (0.8 hectares) are potentially affected; less will be physically impacted.

**5.3.2.11.B.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no direct or indirect adverse impacts to OPS as a result of constructing the 16-Building MOUT package under the Army's Proposed LU & FP (CH&I).

**5.3.2.11.B.3 Chemical Defense Training Facility (Project 45893)**

- **Indirect Impacts.** There will be short and long-term indirect adverse impacts to OPS as a result of constructing the CDTF under the Army's Proposed LU & FP (CH&I). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the permanent loss of over 20 acres (8 hectares) of habitat. A discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.B.

**5.3.2.11.B.4 General Instruction Facility (Project 46090)**

- **Indirect Impact** There will be short and long-term indirect adverse impacts to OPS associated with the construction of the General Instruction Facility (Project 46090) under the Army's Proposed LU & FP (CH&I). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the permanent loss of over 20 acres (8 hectares) of habitat. A discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.B.

**5.3.2.11.B.5 Applied Instruction Facility (Project 46091)**

- **Indirect Impact** There will be short and long-term indirect adverse impacts to OPS associated with the construction of the Applied Instruction Facility (Project 46091) under the Army's Proposed LU & FP (CH&I). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the degradation of over 15 acres (6 hectares) of habitat. A discussion of the specific disturbances associated with construction can be found in subsection 5.3.2.11.B.

**5.3.2.11.B.6 Unaccompanied Personnel Housing (Project 46092)**

- **Indirect Impact** There will be short and long-term indirect adverse impacts to OPS associated with the construction of the Unaccompanied Personnel Housing project under the Army's Proposed LU & FP (CH&I). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the degradation of over 40 acres (16 hectares) of habitat. A discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.B.

#### 5.3.2.11.B.7 Range Modifications (Project 46094)

- **Indirect Impact** There is a potential for indirect long-term significant adverse impacts associated with the construction of the Range Modifications project under the Army's Proposed LU & FP (CH&I).

  The Range Modifications (Project 46094) is the most likely package in the Army's Proposed LU & FP (CH&I) to impact OPS habitat due primarily to the size of the area involved. There will be approximately 775 acres (310 hectares) impacted which is over 79 percent of the total acreage in the entire land use plan. Of the 775 acres likely to be impacted, approximately 572 acres (229 hectares) is currently covered with vegetation in the form of trees, brush, and various grasses. Another potential concern with the Range Modifications project is the fact that 15 percent of the total acreage likely to be disturbed is considered to have a high soil erosion potential. The areas with high erosion potential have steep contours and highly erodible soils, as defined by the USDA Soil Conservation Service.

  Important range modifications projects that may create impacts to OPS habitat include the following: Evasive Driving Course; FFE deterrents training area; M60/M240 Familiarization and Qualification; Mark 19 Familiarization and Qualification; Ballard Hollow Mobile Smoke Training Area; Bailey/McCann Hollow Mobile Smoke Training Area; and Special Reaction Team Ranges. There will be over 525 acres (210 hectares) of vegetation impacted or disturbed by these projects which may lead to increased runoff, soil erosion, and other potentially adverse impacts to OPS habitat.

  BMPs will need to be employed to minimize or mitigate the potentially significant adverse impacts to OPS. A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

#### 5.3.2.11.B.8 Convert Housing (Project 46640)

There will be no direct or indirect adverse impacts to OPS from the Convert Housing (Project 46640), because under the Army's Proposed LU & FP (CH&I), existing facilities will be renovated, and there will be no new construction.

## 5.3.2.11.C Wetlands

Wetlands are complex ecosystems that are transitional from dry land to open water, and they have soil, water, plant, and faunal components. Wetlands are typically defined as those areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil condition. Typical wetland types include swamps, marshes, bogs, and similar areas.

- **Direct Impacts.** Impacts occurring within wetlands such as degradation of vegetation, removal or redistribution of soil, and/or altering hydrology would be considered direct impacts to wetlands. If wetland vegetation is destroyed or disturbed, it will reduce the cover and food benefits to species of wildlife that utilize wetland habitats, especially migratory birds and aquatic species.

- **Indirect Impacts.** Indirect impacts that effect the watershed or external hydrology of a wetland can be deleterious to wetland plants or animals and can degrade or eliminate the functional benefits of that wetland. Without the necessary amount of water, either through flooding, ponding, or ground water flow, the anaerobic conditions in the soil will not persist and non-wetland plants will begin to become established.

  Construction of new facilities, ranges, or training areas may cause indirect adverse impacts to wetlands. The removal of vegetation, dirt work, and creation of impervious surfaces such as parking lots or buildings, during construction operations may lead to increased runoff and

subsequent erosion. The increased runoff may contain sediment, contaminants, and other construction related debris. Sediment loading may effect wetlands in many ways including altering water quality parameters such as dissolved oxygen, pH, conductivity, and heavy metal concentrations, degrading or destroying wetland vegetation, causing mortality in aquatic organisms, physically filling a wetland, and/or substantially altering the hydrology of the wetland. Excessive sediment input can physically cover plants or increase the turbidity enough to interfere with photosynthesis.

One of the important functional values of wetlands includes the water purification aspect. Wetlands and wetland vegetation may physically filter water or slow the velocity of moving surface waters which allows silt and debris to be deposited in the wetland. Wetland vegetation can also absorb some contaminants such as phosphorus or other waterborne chemicals/contaminants. Typically, runoff from unmitigated construction operations will include sediment, construction debris, and vehicle byproducts such as fuels, motor oils, transmission fluids, hydraulic fluids, grease, and brake fluids.

Through the use of proper construction techniques and BMPs most adverse impacts to wetlands can be minimized or eliminated. A detailed list of BMPs related to construction management, soil stabilization, runoff control, and stream erosion and sediment control are described in subsection 5.1.4.1. Under Section 404 of the Clean Water Act, FLW personnel will need to coordinate the removal or degradation of wetlands with the Corps of Engineers, and mitigation may be required for degraded wetlands. Since there are no requirements to mitigate the loss of nonjurisdictional wetlands, the assessment and replacement of nonjurisdictional wetlands will be at the discretion of FLW.

**5.3.2.11.C.1 General Officers Quarters (Project 38174).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the General Officers Quarters (Project 38174) under the Army's Proposed LU & FP (CH&I).

**5.3.2.11.C.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the 16-Building MOUT package under the Army's Proposed LU & FP (CH&I).

**5.3.2.11.C.3 Chemical Defense Training Facility (Project 45893)**

- **Direct Impacts.** There will be long-term direct adverse impacts to wetlands as a result of constructing the CDTF under the Army's Proposed LU & FP (CH&I). There are several small, less than 0.14 acres total, nonjurisdictional wetlands at the proposed CDTF site, which were probably created through past training activities. These areas are very small , have very low functional values, and do not meet the hydric soils criteria as defined by the 1987 USACE wetland delineation manual. FLW DPW will coordinate the jurisdictional status determination of these wetlands with the Corps of Engineers prior to construction.

**5.3.2.11.C.4 General Instruction Facility (Project 46090).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the General Instruction Facility (Project 46090) under the Army's Proposed LU & FP (CH&I).

**5.3.2.11.C.5 Applied Instruction Facility (Project 46091).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the Applied Instruction Facility (Project 46091) under the Army's Proposed LU & FP (CH&I).

**5.3.2.11.C.6 Unaccompanied Personnel Housing (Project 46092).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the Unaccompanied Personnel Housing (Project 46092) under the Army's Proposed LU & FP (CH&I).

#### 5.3.2.11.C.7 Range Modifications (Project 46094)

- **Direct Impacts.** There will be long-term direct adverse impacts to nonjurisdictional wetlands as a result of constructing the Range Modifications (Project 46094) under the Army's Proposed LU & FP (CH&I). Two small nonjurisdictional wetlands will be destroyed during the construction of the Evasive Driving Course. These man-created areas are very small , have very low functional values, and do not meet the hydric soils criteria as defined by the 1987 USACE wetland delineation manual.

- **Indirect Impacts.** There will be short-term indirect adverse impacts to non-jurisdictional wetlands as a result of constructing the Range Modifications (Project 46094) under the Army's Proposed LU & FP (CH&I). A discussion of the possible impacts from construction activities on wetlands can be found in subsection 5.3.2.11.C.

  Important range modification projects that may cause indirect adverse impacts to wetlands include: Evasive Driving Course; FFE deterrents training area; M60/M240 Familiarization and Qualification; Mark 19 Familiarization and Qualification; Ballard Hollow Mobile Smoke Training Area; Bailey/McCann Hollow Mobile Smoke Training Area; and Special Reaction Team Ranges. The removal of vegetation and earth work as part of construction will increase the likelihood of soil erosion which may be carried off-site through surface water runoff. The sediment laden waters may impact downstream wetlands, especially the bottomland hardwood wetlands adjacent to Roubidoux Creek and Big Piney Creek. Impacts to these wetlands can be minimized by using the BMPs as outlined in subsection 5.5.1.4.

  Construction of the Mobile Smoke Range at Ballard Hollow could impact a 7.4-acre (3 hectares) seasonally flooded bottomland hardwood wetland. Although the smoke range construction will not be within the wetland, the construction zone for the range will be within 330 feet (100 meters) of the wetland boundary.

**5.3.2.11.C.8 Convert Housing (Project 46640).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the Convert Housing (Project 46640), because under the Army's Proposed LU & FP (CH&I), existing facilities will be renovated, and there will be no new construction.

## 5.3.2.11.D Aquatic Resources

In the Army's Proposed LU & FP (CH&I) there will be approximately 983 acres (393 hectares) of the FLW installation impacted by construction activities. Approximately 70 percent of that acreage is currently covered with vegetation such as trees, brush, or grasses, and the remaining 30 percent of the project area is currently developed or improved. Typical developed lands consist of roads, parking lots, buildings, improved training ranges, or other disturbed areas.

- **Indirect Impacts.** Construction of new facilities, ranges, or training areas may cause indirect adverse impacts to aquatic resources. The removal of vegetation, dirt work, and creation of impervious surfaces such as parking lots or buildings, during construction operations may lead to increased runoff and subsequent erosion. The increased runoff may contain sediment, contaminants, and other construction related debris. Sediment loading in streams may increase turbidity and affect other water quality parameters such as dissolved oxygen, pH, conductivity, and heavy metal concentrations.

  Aquatic species, especially sedentary species, are often adversely impacted by degraded water quality. High turbidity from eroded sediments can decrease plankton production, interfere with the uptake of oxygen, and cause mortality in some species that are sensitive to water quality. Increased turbidity can decrease foraging efficiency for predators, especially sight feeding predators like small mouth bass or trout, which can lead to slow growth rates and/or poor overall condition. Stressed species are more susceptible to disease and parasites.

Construction sites are often exposed to vehicle and equipment contaminants. Leaks of oil, fuel, grease, hydraulic fluid, brake fluid, antifreeze, and other substances can be transported through surface water runoff. Some construction related materials have the potential to stress aquatic organisms and, in some cases, cause mortality.

Through the use of proper construction techniques and BMPs most adverse impacts to aquatic species can be minimized or eliminated. A detailed list of BMPs related to construction management, soil stabilization, runoff control, and stream erosion and sediment control are described in subsection 5.5.1.4.

FLW will be required to obtain a Missouri State Operating Permit under the Water Pollution Control Program of the MDNR Clean Water Commission for the construction of new facilities. This permit is in compliance with the Missouri Clean Water Law (Chapter 644 R.S. MO as amended) and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress). Fort Leonard Wood will need to apply to be included in the State General Storm Water Permit as required by 10 CSR 20-6.200 for any area disturbed that is greater than five acres (2 hectares) and will be required to implement soil erosion control and stabilization measures. In accordance with standard Army policy, the Army will require that individual contractors hired to construct the required facilities apply for, obtain and remain in compliance with the Missouri State Operating Permit. According to the requirements of the permit, storm water discharges must comply with the Water Quality Standards 10 CSR 20-7.031(3), and the permit will contain a detailed description of the water quality sampling requirements. By operating under the guidelines established by the MDNR permits and by using BMPs as outlined in subsection 5.5.1.4, there will be no significant adverse impacts to aquatic resources as a result of new facility construction.

#### 5.3.2.11.D.1 General Officers Quarters (Project 38174)

- **Indirect Impacts.** There is a potential for minor short-term indirect adverse impacts to aquatic species as a result of constructing the General Officers Quarters under the Army's Proposed LU & FP (CH&I). Since there will be a very small area disturbed during the construction of this package, the potential impacts will be very minor.

#### 5.3.2.11.D.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892)

- **Indirect Impacts.** There is a potential for minor short-term indirect adverse impacts to aquatic species as a result of constructing the MOUT package under the Army's Proposed LU & FP (CH&I). Since there will be a small area disturbed during the construction of this package, the potential impacts will be very minor. The use of proper BMPs will minimize or eliminate potential impacts.

#### 5.3.2.11.D.3 Chemical Defense Training Facility (Project 45893)

- **Indirect Impacts.** There is a potential for short-term indirect adverse impacts to aquatic species as a result of constructing the CDTF under the Army's Proposed LU & FP (CH&I). Adverse impacts to aquatic resources are anticipated, because the area to be disturbed will be greater than 20 acres (8 hectares) , and most of that acreage is currently forested. The use of proper BMPs will minimize potential impacts.

#### 5.3.2.11.D.4 General Instruction Facility (Project 46090)

- **Indirect Impacts.** There is a potential for short-term indirect adverse impacts to aquatic species as a result of constructing the General Instruction Facility (Project 46090) under the Army's Proposed LU & FP (CH&I). Over 25 acres (10 hectares) of vegetation will have to be cleared in order to construct this package, and all of the acreage will be in the Dry Creek watershed which eventually flows into the Big Piney. The use of proper BMPs will be necessary in order to minimize potential impacts.

### 5.3.2.11.D.5 Applied Instruction Facility (Project 46091)

- **Indirect Impacts.** There is a potential for short-term indirect adverse impacts to aquatic species as a result of constructing the Applied Instruction Facility (Project 46091) under the Army's Proposed LU & FP (CH&I). Nearly half of the 41 acres (16 hectares) associated with this package are currently vegetated. Clearing/construction operations may adversely impact aquatic species in the Roubidoux Creek watershed if runoff is not controlled through proper use of BMPs.

### 5.3.2.11.D.6 Unaccompanied Personnel Housing (Project 46092)

- **Indirect Impacts.** There may be short-term indirect adverse impacts to aquatic species as a result of constructing the Unaccompanied Personnel Housing (Project 46092) under the Army's Proposed LU & FP (CH&I). Of the approximately 80 acres (32 hectares) to be disturbed there may be up to 40 acres (16 hectares) of vegetation cleared. A project of this size is likely to cause adverse impacts to aquatic resources in the Dry Creek/Big Piney watershed, however, most of these impacts can be minimized through the use of BMPs identified in 5.3.2.5.A.

### 5.3.2.11.D.7 Range Modifications (Project 46094)

- **Indirect Impacts.** There will be short-term indirect adverse impacts to aquatic species as a result of constructing the Range Modifications (Project 46094) under the Army's Proposed LU & FP (CH&I). Since most of the new range construction is taking place on existing ranges or improved training areas, no significant impacts to aquatic species are anticipated.

  The Range Modifications project is the most likely package in the Army's Proposed LU & FP (CH&I) to impact aquatic resources due primarily to the size of the area involved. There will be approximately 775 acres (310) impacted which is over 79 percent of the total acreage in the entire land use plan. Of the 775 acres likely to be impacted, approximately 572 acres (229 hectares) is currently covered with vegetation in the form of trees, brush, and various grasses. Another potential concern with the Range Modifications (Project 46094) is the fact that 15 percent of the total acreage likely to be disturbed is considered to have a high soil erosion potential. The areas with high erosion potential have steep contours and highly erodible soils, as defined by the USDA Soil Conservation Service (SCS, 1989).

  Important range modifications projects that may create impacts to aquatic resources include the following: Evasive Driving Course; FFE deterrents training area; M60/M240 Familiarization and Qualification; Mark 19 Familiarization and Qualification; Ballard Hollow Mobile Smoke Training Area; Bailey/McCann Hollow Mobile Smoke Training Area; and Special Reaction Team Ranges. There will be over 525 acres (210 hectares) of vegetation impacted or disturbed by these projects which may lead to increased runoff, soil erosion, and other potentially adverse impacts to aquatic species. Following some or all of the suggested construction BMPs as described in subsection 5.5.1.4 will be necessary to minimize possible impacts.

  The mobile smoke training area in Ballard Hollow is a concern for aquatic resources, because there will be an unimproved crossing on Roubidoux Creek. The affected portion of Roubidoux Creek that has the creek crossing is within a losing section of stream that is normally dry except in wet weather conditions. Impacts to aquatic species can be minimized by restricting or eliminating access to the creek when there is flowing water.

**5.3.2.11.D.8 Convert Housing (Project 46640).** Since the Army's Proposed LU & FP (CH&I) Convert Housing (Project 46640) consists of utilizing existing facilities or renovating existing facilities, there will be no adverse impacts to aquatic resources.

## 5.3.2.11.E Terrestrial Resources

Under the Army's Proposed LU & FP (CH&I) approximately 983 acres (393 hectares) of the installation will be affected, which is 1.6 percent of the total installation acreage, and approximately 70 percent (688 acres (275 hectares)) of that acreage is covered with vegetated habitat. Over 61 percent of the impacted terrestrial habitat is covered with brush or forest. The impacts to common terrestrial species of wildlife are not expected to be significant. Many of the common terrestrial wildlife species are adapted to and often prefer early successional habitats such as disturbed areas, edge, and/or fragmented habitats that construction activities may create.

- **Direct Impacts.** Construction of new facilities, ranges, or training areas may cause direct and indirect adverse impacts to terrestrial resources. The primary direct impacts to vegetation will be the destruction, degradation, or fragmentation of vegetative communities. Degradation of habitat could occur due to clearing, grading, grubbing, excavating, root cutting, and soil compaction during construction operations.

  Noise and dust generated by construction activities could cause minor adverse impacts to birds, reptiles, and mammals. The disturbance from construction noise and the increased presence of people and machinery is considered an annoyance to some terrestrial organisms. Increased noise levels and the increased presence of people and equipment on training areas and ranges could disturb resident wildlife and cause areas to be temporally abandoned which may increase stress levels. These types of disturbance to resident wildlife species could also inhibit mating, breeding, nesting, and feeding/foraging behavior. Increased stress levels in effected species could lead to insufficient nutritional intake, slow growth rates, low condition factors, low fecundity, and low recruitment rates which could all be deleterious to the resident species. Indiscriminate off-road operation of vehicles could be harmful to ground-nesting birds and less mobile species of wildlife, and degraded air quality from vehicle emissions and dust could cause respiratory stress in some species. Due to the mobility of most terrestrial wildlife species, direct mortality from construction operations is expected to be very small.

- **Indirect Impacts.** The loss, degradation, and continued fragmentation of habitat will be the primary indirect impact to terrestrial wildlife. Degradation of habitat could occur due to clearing, grading, grubbing, excavating, root cutting, soil compaction, and soil erosion. The majority of the proposed construction projects will be built in areas currently or previously used as ranges or other training areas. The terrestrial habitats are largely non-native grasslands, old fields that will revert to forest without management or disturbance, and relatively young forest stands. There are no known unique habitats such as high quality glades, old growth forests, or state designated natural areas are within the proposed construction zones.

  The removal of vegetation, dirt work, and creation of impervious surfaces such as parking lots or buildings, during construction operations may lead to increased runoff and subsequent erosion. The increased runoff may contain sediment, contaminants, and other construction related debris that may cause damage or mortality to vegetation. Soils could be impacted from spilling and leaking of fuel, motor oil, brake fluid, steering fluid, transmission fluid, hydraulic fluid, and grease which could degrade vegetation or impact water quality. Sensitive habitats could be destroyed or altered by off-road vehicle use. Vehicle operation on training areas during construction could remove or damage vegetation, cause soil erosion or compaction, and leave vehicle ruts. Some construction related materials have the potential to stress or cause mortality to vegetation or other terrestrial species. Restricting the movement of construction equipment in wet weather conditions will reduce potential adverse impacts to terrestrial species habitat.

  Eroded areas, disturbed areas, and areas that have denuded vegetation are frequently revegetated with invasive or exotic plant species that are difficult to control, such as cocklebur, honey locust, or kudzu. Implementing an aggressive noxious weed control plan and controlled burning program may minimize the potential for exotics to become established.

**5.3.2.11.E.1 General Officers Quarters (Project 38174).** There will be no direct or indirect adverse impacts to terrestrial resources as a result of constructing the General Officers Quarters (Project 38174) under the Army's Proposed LU & FP (CH&I). Only two acres (.8 hectares) are potentially affected; less will actually be physically impacted.

**5.3.2.11.E.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no direct or indirect adverse impacts to terrestrial resources as a result of constructing the 16-Building MOUT package under the Army's Proposed LU & FP (CH&I). The nine acres (4 hectares) this project has the potential to affect is less than 0.015 percent of the total FLW land area and is in a previously disturbed area.

**5.3.2.11.E.3 Chemical Defense Training Facility (Project 45893)**

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the CDTF under the Army's Proposed LU & FP (CH&I). There will be over 20 acres (8 hectares) of vegetation destroyed or degraded during the construction of this package and over 90 percent of that habitat is forested. There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the CDTF because of noise, dust, and disturbance. A detailed discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.E.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the CDTF under the Army's Proposed LU & FP (CH&I). The permanent loss and continued fragmentation of habitat will be the primary long-term impact to terrestrial wildlife.

**5.3.2.11.E.4 General Instruction Facility (Project 46090)**

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the General Instruction Facility project under the Army's Proposed LU & FP (CH&I). There will be over 28 acres (11 hectares) of potential terrestrial habitat directly impacted by clearing or other construction related disturbances during the construction of this package. Nearly half of the affected acreage (13 acres (5 hectares) ) is forested. There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the General Instruction Facility project because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the General Instruction Facility (Project 46090) under the Army's Proposed LU & FP (CH&I). The permanent loss of habitat will be the primary long-term impact to terrestrial wildlife.

**5.3.2.11.E.5 Applied Instruction Facility (Project 46091)**

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the Applied Instruction Facility (Project 46091) under the Army's Proposed LU & FP (CH&I). Approximately 20 acres (8 hectares) of terrestrial habitat, which is currently dominated by grass, brush, and trees, will be removed or degraded during the construction of this package. There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the Applied Instruction Facility (Project 46091) because of noise, dust, and disturbance. A detailed discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.E.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the Applied Instruction Facility (Project 46091) under the Army's Proposed LU & FP (CH&I). The permanent loss of habitat will be the primary long-term impact to terrestrial wildlife.

#### 5.3.2.11.E.6 Unaccompanied Personnel Housing (Project 46092)

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the UPH project under the Army's Proposed LU & FP (CH&I). Approximately 40 acres (16 hectares) of vegetation will be directly impacted during the construction of this package. There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the UPH, Enlisted Housing package because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the UPH project under the Army's Proposed LU & FP (CH&I). The permanent loss of habitat will be the primary long-term impact to terrestrial wildlife.

#### 5.3.2.11.E.7 Range Modifications (Project 46094)

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the Range Modifications project under the Army's Proposed LU & FP (CH&I). The Range Modifications project is the most likely package in the Army's Proposed LU & FP (CH&I) to impact terrestrial resources due primarily to the size of the area involved. There will be approximately 775 acres (310 hectares) impacted which is over 79 percent of the total acreage in the entire land use plan. Of the 775 acres likely to be impacted, approximately 572 acres (229 hectares) is currently covered with vegetation in the form of trees, brush, and various grasses. Another potential concern with the Range Modifications project is the fact that 15 percent (117 acres (47 hectares)) of the total land use plan acreage likely to be disturbed is considered to have a high soil erosion potential.

  Important range modifications projects that may create direct impacts to vegetation include the following: Evasive Driving Course; FFE deterrents training area; M60/M240 Familiarization and Qualification; Mark 19 Familiarization and Qualification; Ballard Hollow Mobile Smoke Training Area; Bailey/McCann Hollow Mobile Smoke Training Area; and Special Reaction Team Ranges. There will be over 525 acres (210 hectares) of vegetation impacted or disturbed by these seven projects of which 61 percent (350 acres (140 hectares)) is covered with trees and brush.

  There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the Range Modifications project because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the Range Modifications project under the Army's Proposed LU & FP (CH&I). The permanent loss and continued fragmentation of habitat will be the primary long-term impact to terrestrial wildlife, however, the degradation of vegetation and subsequent increased soil erosion will also impact terrestrial habitat.

**5.3.2.11.E.8 Convert Housing (Project 46640).** There will be no adverse impacts to terrestrial resources as a result of implementing the Convert Housing project, because under the Army's Proposed LU & FP (CH&I), existing facilities will be renovated, and there will be no new construction.

## 5.3.2.12 Cultural Resources

Based on the cultural resource compliance activities outlined in subsection 4.11, the guidance provided by the HPP and recent Phase 1 surveys by the FLW archaeologist in support of the proposed BRAC training facilities, construction and facility development activities will not impact the NHRP eligible cultural resources. Phase 1 archaeological surveys have been conducted at all of the locations where BRAC actions are to occur, for all the alternatives. As a result of these investigations, a determination of "no effect" has been established for proposed BRAC mission at FLW by the State of Missouri, State Historic Preservation Officer (Appendix G).

However, if archaeological materials are encountered during construction, all work will stop and the FLW archaeologist will be contacted immediately. Further guidance for this issue is provided in the treatment section of the HPP, specifically SOP No. 8, Emergency Archaeological Discovery (FLW, 1992c). In addition, all training activities will be conducted in accordance with FLW Regulation 210-14, Ranges and Training Areas (FLW, 1993a).

If the proposed BRAC action should require use of an historic structure, any alterations must conform to the Secretary of Interior's Standards and Guidelines and the Treatment Plans for architectural resources set forth in the HPP (FLW, 1992c). There are no plans for the use of historic buildings for BRAC activities.

## 5.3.2.13 Sociological Environment

**5.3.2.13.1 Issue: *Sociological Impacts.*** The sociological impacts of facility construction are independent of individual facilities, and, thus, are considered on an aggregate basis. Implementation of any of the three alternative land use plans will result in the same type of sociological impacts, with the only difference being in the magnitude of the impacts. These impacts will be related to the additional demand for rental housing, and the associated increase in school enrollment resulting from those construction workers that relocate their families. The majority of these impacts will be short-term and occur prior to the relocation of the military and civilian population associated with the Military Police School and Chemical School.

- **Direct Impacts.** Short-term direct impacts will result during the approximate two-year construction period. The EIFS Model estimates that 30 percent of the construction work force will migrate into the local area temporarily during facility construction. According to the EIFS Construction Model, there will be a demand for 232 rental housing units under the Army's Proposed LU & FP (CH&I) Alternative. Although there is currently (1996) a short supply of rental apartments in the FLW area, this additional short term demand should be able to be accommodated through a variety of rental options, including mobile homes, single family residences, motel rooms, and apartments. Any new construction of rental housing to accommodate this temporary demand could be used for rental purposes by the subsequent relocated permanent military and/or civilian population which is discussed in subsections 5.4.2.13 and 5.4.2.14.

- **Indirect Impacts.** Short-term indirect impacts will be experienced by the local school districts, primarily the Waynesville R-VI District. The EIFS Construction Model estimates an additional 96 school age children associated with the construction work forcer under the Army's Proposed LU & FP (CH&I). This increase in the student load is equivalent to a demand for approximately three classrooms. The capacity of the local school facilities will be sufficient to absorb this additional short-term demand without additional new facility construction.

**5.3.2.13.2 Issue: *Environmental Justice.*** As discussed in Volume III, Appendix D, Executive Order 12898, issued in February 1994, directs federal agencies to identify and analyze the potential socioeconomic impacts of proposed actions in accordance with health and environmental laws. In this regard, the Executive Order requires each federal agency to make the achievement of environmental justice a part of its mission by identifying and addressing disproportionately high and adverse human health and environmental effects of its programs, policies and activities on minority populations and low-income populations.

Implementation of any of the three alternative land use and facility plans (Army's Proposed Action (Combined Headquarters and Instruction), Alternative 1 (Combined Headquarters) or Alternative 2 (Separate Headquarters) include:

- construction sites on-post which will not disproportionately affect minority population areas;

- construction activities that will be accomplished by Federal government and contractor workforces hired by the Federal government will be conducted in compliance with Equal Employment Opportunity regulations and guidance and should eliminate disproportionate impacts on minority populations; and

- construction that will be accomplished by a cross section of the local population, ensuring no disproportionate impacts on minority populations.

## 5.3.2.14 Economic Development

The economic impacts of facility construction are independent of individual facilities, and, thus, are considered on an aggregate basis. Implementation of any of the three alternative land use plans will result in the same type of economic impacts, with only the magnitude differing. All of the impacts would be beneficial and of short-term duration as associated with the construction period which is scheduled for a two-year period from April 1997 to April 1999.

Economic indicators (i.e. business volume, employment, income) are used to measure the magnitude of impacts. The magnitude of these effects are portrayed in Volume III, Appendix E. The EIFS Model for facility construction was executed for each of the three alternative land use plans. It is important to note that the total facility construction cost under each alternative was pro-rated over the duration of the construction period (two years) because the EIFS projected impacts are on an annual basis.

- **Direct Impacts.** Direct short-term economic impacts consist of an increase in business (sales) volume, employment and income during construction of the facilities. Almost 800 construction jobs would be created for facility construction under the Army's Proposed LU & FP (CH&I). As indicated in Appendix E, the direct annual economic impacts of facility construction consist of increases of $41,260,000 in business volume; 418 jobs in retail trade; services and industry; and $5,690,000 in direct personal income under the Army's Proposed LU & FP (CH&I). The latter represents the earnings of the employees in the local and regional retail, wholesale and service establishments that are initially affected by the construction activity. The direct economic impacts are less under this land use plan alternative than under the other two land use plan alternatives because of the lower facility construction cost ($200 million). The Rational Threshold Value (RTV), which is a measure of significance of annual economic activity, is not approached for any of the above economic indicators.

- **Indirect Impacts.** Indirect impacts comprise secondary sales, employment and income generated by the employment and business activity directly associated with facility construction The direct increase in sales and employment generates secondary sales of $38,657,000 and creates an additional 390 jobs. Total income generated, including direct and indirect, exceeds $28 million. The indirect economic impacts are less under this land use plan alternative than under the other two land use plan alternatives because of the lower facility construction cost ($200 million).

## 5.3.2.15 Quality of Life

This subsection examines the potential effects of the Army's Proposed LU & FP (CH&I) on the quality of life of students, staff and/or members of the surrounding civilian community. As described in Section 3, there are three components of the proposed action. The following paragraphs identify and describe issues of concern in the impact analysis of the Land Use and Facility Development alternatives. The discussion has been divided into two parts: general quality of life issues (subsection 5.3.2.15.A) and issues involving human health and safety (subsection 5.3.2.15.B). Only alternatives which present potential impacts are discussed. No discussion of an alternative in a section means that no potential impacts associated with that alternative were identified.

## 5.3.2.15.A Quality of Life

The following issues related to the Quality of Life have been identified with the implementation of the Army's Proposed Land Use Facility Plan:

- Provision of Community Support Services Facilities;
- Recreational Access;
- Fishing Quality; and
- Proximity of MOUT Training to Cantonment.

**5.3.2.15.A.1 Issue: *Provision of Community Support Services Facilities.*** Provision of Community Support Services facilities. No impacts are anticipated to occur to the installation's ability to provide Community Support Service facilities. Using guidelines defined in the Army Criteria Tracking System, the facilities and their respective sizes listed in Table 5.48 have been determined by EIS analysts and the FLW Master Planning Office to be sufficient to sustain Community Support Services programs and activities at the population levels projected to occur with the mission relocation.

**Table 5.48:**
**Community Support Service Facilities**

| Facility | Existing Area (feet$^2$) | Area Allowed (feet$^2$) | Area Required (feet$^2$) | Area Surplus/ Deficit (feet$^2$) | Remarks |
|---|---|---|---|---|---|
| Post Chapel and Unit Chapels | 57,339 | 56,000 | 56,000 | 1,339 | The existing projects to replace semi-permanent and temporary structures are not influenced by BRAC actions or projected population levels. |
| Religious Education and Chapel Center Facilities | 20,019 | 25,840 | 25,840 | - 5,821 | The deficit and existing semi-permanent and temporary structures are to be replaced by the use of part of Building 315. The deficit is existing and not a result of BRAC actions. The current projects to replace semi-permanent and temporary structures are not influenced by BRAC actions or projected population levels. |
| Community Center | 24,500 | 11,900 | 24,500 | 0 | |
| Drug Abuse Center | 1,000 | n/a | 1,000 | 0 | |
| Post Office, Main | 10,245 | 10,125 | 10,125 | 120 | The existing temporary Building 427 is to be replaced by a permanent structure that meets current codes. The deficit is existing and is not a result of BRAC actions. |
| Bank | 11,520 | 13,000 | 11,520 | 0 | The existing area is adequate to support the total requirements following BRAC actions. |
| Skill Development Center | 14,800 | 35,000 | 14,800 | 0 | The current center is not fully utilized. The existing area is adequate to support the anticipated post- BRAC requirements. |
| Skill Development Center, Auto | 8,840 | 15,000 | 8,840 | 0 | The current center is not fully utilized. The existing area is adequate to support the anticipated post-BRAC requirements. |
| Youth Center | 21,868 | 18,500 | 21,868 | 0 | |
| Bowling | 34,160 | 34,800 | 34,800 | - 640 | The existing facilities have been determined to be adequate to support the post-BRAC population. |
| Clothing Sales | 10,000 | 7,800 | 11,000 | - 1,000 | 7,800 square feet are allowed for Army needs. An additional 3,200 square feet are allowed for the requirements of the other services. These requirements are not affected by BRAC actions. |
| Commissary | 70,986 | n/a | 70,986 | 0 | The facility is sized to accommodate the 1990 installation population and will be adequate to support the BRAC population. |

**Table 5.48:**
**Community Support Service Facilities**

| Facility | Existing Area (feet$^2$) | Area Allowed (feet$^2$) | Area Required (feet$^2$) | Area Surplus/ Deficit (feet$^2$) | Remarks |
|---|---|---|---|---|---|
| Army Continuing Education | 39,424 | 34,000 | 39,424 | 0 | |
| Gymnasium | 188,104 | 132,691 | 188,104 | 0 | |
| Indoor Pool | 13,300 | 13,300 | 13,300 | 0 | Indoor pool is provided at the Gymnasium. |
| Open Dining NCO | 28,556 | 59,200 | 28,556 | 0 | Provision of these facilities is currently based on profitability. The existing area is adequate to support the anticipated post-BRAC requirements. |
| Open Dining Officer | 22,468 | 27,800 | 22,468 | 0 | Provision of these facilities is currently based on profitability. The existing area is adequate to support the anticipated post-BRAC requirements. |
| Exchange (Main Store) | 50,994 | n/a | 50,994 | 0 | Additional facilities have been programmed, including cafeteria renovation in Lincoln Hall, an all-seasons auto shop and a troop housing mini-mart. AAFES is investigating the need for an additional Exchange service outlet. |
| Baseball | 2 | 6 | 2 | 0 | A needs analysis and utilization data indicate the number of existing fields is adequate for the current and post-BRAC population. |
| Softball | 17 | 40 | 16 | 1 | The exceptional quality of the fields (irrigated, drained, lit) allows additional usage. A needs analysis and utilization data indicate the number of existing fields is adequate for the current and post-BRAC population. |
| Multi-athletic Field - Football, Soccer | 9 | 20 | 9 | 0 | The exceptional quality of the fields (irrigated, drained, lit) allows additional usage. A needs analysis and utilization data indicate the number of existing fields is adequate for the current and post-BRAC population. |

Note:
1) Existing Area based on FLW facilities data from Table 4.22.
2) Area Allowed calculation based on Army Criteria Tracking System procedures which are subject to modification based on local requirements.
3) Area Required based on historical and projected use information at FLW.
4) Area/Surplus Deficit based on *Existing Area* minus *Area Required.*

*Source: FLW Master Planning Office, May 1996*

## 5.3.2.15.A.2 Issue: *Recreational Access*

- **Direct Impacts:** As discussed in subsection 5.2.2.2.3, construction and security operations at the CDTF will require the establishment of a 985-foot (300-meter) (radius) safety zone around the project site. No access for recreational uses, including hunting and fishing, will be allowed in the security area. The impact of this restricted access will be minimal.

  Two soccer fields and two softball fields that are located at the proposed site of the Unaccompanied Personnel Housing project north of Lincoln Hall will be demolished if this land use plan is implemented. As part of the Unaccompanied Personnel Housing (Project 46092) construction effort these fields will be replaced with new fields constructed at the site currently occupied by building 2510 and 2516. These buildings are located north of First Street, east of the intersection of Nebraska Avenue and First Street. Both buildings are currently scheduled for demolition under a separate actions planned by the installation. The two lost softball fields will replaced through the modification and upgrade of Hilltopper Baseball Field and the construction of a new ball field to the north of that field. Modifications and upgrades to the Hilltopper Baseball Field will include the installation of irrigation and new fencing. The new locations for the fields will

make the fields more accessible to the installations population. Consequently, this conversion will have a beneficial impact on the availability of these recreation facilities.

**5.3.2.15.A.3 Issue: *Fishing Quality.*** Use of TA 250 for FOX amphibious training will not have the potential for negative impacts on recreational fishing associated with the other alternatives.

**5.3.2.15.A.4 Issue: *Proximity of MOUT Training to Cantonment.*** The use of smoke grenades could occur at the MOUT because they have application in a number of different types of training activities. For a detailed discussion of human health issues concerning smoke grenades, see subsection 5.2.2.15.B.2. With implementation of this alternative, MOUT training will be isolated from the cantonment and other non-range and training area activities. This will negate the potential for impacts on nearby building occupants.

## 5.3.2.15.B Human Health and Safety

The following issue is raised concerning construction activities at FLW associated with the transfer of the Chemical School and the Military Police School from FMC involves safety during construction.

### 5.3.2.15.B.1 Issue: *Safety During Construction*

- **Direct Impacts.** Standard safety procedures used during construction will be required by construction contracts administered by the Army Corps of Engineers. These procedures will minimize short-term safety impacts associated with the construction efforts.

## 5.3.2.16 Installation Agreements

No impacts on installation agreements are anticipated to result from the implementation of the Army's Proposed LU & FP (CH&I).

## 5.3.2.17 Operational Efficiency

**5.3.2.17.1 Overview.** The analysis contained in Appendix C was initiated with the intent of identifying the land use and facility siting plan that would enable the relocated schools to best meet their training missions, while at the same time meeting the intent of the BRAC Commission. The BRAC Commission recommendation to move the Military Police School and the Chemical School to FLW was based on a detailed economic and operational analysis. According to the BRAC Commission, collocation would allow the Army to focus on the doctrinal and force development requirements of the Engineer Corps, Military Police Corps and Chemical Corps. The synergistic advantages of collocation involve both peacetime training efficiencies, and the development of programs and doctrine which would prove more effective in wartime environments. Key programs which were specifically targeted for the development of improved doctrine include:

- coordination, employment and removal of obstacles to movement (TG 1.3 Mines and Obstacles to Prevent Movement);
- the conduct of river crossing operations (included as one of the elements in TG 1.2 Maneuver Operations);
- operations in rear areas along main supply routes (included as one of the elements in TG 1.8 Warfighting and Tactical Operations); and
- counter-drug operations (included as one of the elements in both TG 5.1 Basic Military Police Functions and TG 5.2 Advanced Law Enforcement and Operations Other-than-War).

Relocation of the Military Police School and the Chemical School to FLW and the formation of the Maneuver Support Command (MANSCEN) in conjunction with the Engineer School presents a unique opportunity to consolidate the training conducted by the three schools at one location and take advantage of their synergism to establish a more effective and efficient training organization. The TRADOC Commander has directed the consolidation of functions to increase operational efficiency wherever possible.

**5.3.2.17.2 Development and Initial Review of Alternative Land Use Plans.** The analysis of land use and facility plan alternatives for the proposed action started with a review of the existing land use plans on the installation that were established by the *Master Plan for the U.S. Army Engineer Center and Fort Leonard Wood* (FLW, 1991c) and *Fort Leonard Wood Training Area Master Plan* (FLW, 1990a). Subsections C.4.2.1 and C.4.2.2 in Volume III, Appendix C provide additional information concerning the differences between the three land use development plans used to develop the land use and facility plan alternatives. These subsections also provide a comparative analysis of the alternate land use plans. Each of the land use and facility plan alternatives has been determined to be capable of providing the facilities necessary for the instruction of personnel in the knowledge and skills required to carry out their responsibilities effectively, while safeguarding their own and civilian health and safety.

Following identification and development of the three land use and facility alternatives ((1) Combined Headquarters, (2) Separate Headquarters, and (3) Combined Headquarters and Instruction) a review related to operationally efficiency was performed to identify the Land Use and Facility Plan for the Army's Proposed Action. Twelve criteria were developed for this review. The criteria included:

- Equality of facilities provided to the Engineer School, Chemical School and the Military Police School;
- Effectiveness in the use of existing, available facilities for the functions that they were originally designed to support;
- Effectiveness in the conversion of existing, available facilities for other than their design use;
- On- and off-post traffic flow;
- Flexibility in the future use of facilities;
- Proximity of One Station Unit Training (OSUT) billets to their associated general and applied instruction facilities;
- Proximity of Non-Commissioned Officer Academy (NCOA) billets to their associated general and applied instruction facilities;
- Proximity of Officer billets to their associated applied instruction facilities;
- Proximity of Officer billets to their associated general instruction facilities;
- Lowest overall construction cost;
- Lowest overall site development cost; and
- Lowest overall utility system construction cost.

Table C.22, in Volume III, Appendix C, which has been replicated below as Table 5.49, summarizes the results of the review for each land use plan. Based on the analysis captured in Volume III, Appendix C, the Combined Headquarters and Instruction Land Use and Facility Plan was selected as the Army's Proposed Action since it received the highest rating in 9 of the 12 criteria, and the highest overall score with 31 out of a maximum of 36 points. Consequently the Combined Headquarters and Instruction Land Use and Facility Plan (and associated construction project package) was selected as the Army's Proposed Action. Following selection of the Combined Headquarters and Instruction Land Use and Facility Plan as the Army's Proposed Action, the Combined Headquarters Land Use and Facility Plan was selected as Alternative I, and the Separate Headquarters Land Use and Facility Plan was selected as Alternative 2.

**5.3.2.17.3 Evaluation.** The operational concept includes the consolidation of most of the non-teaching functions of the three schools and provides consolidated non-commissioned officer education systems. The guiding principle that this plan incorporates is that those activities that are functionally related benefit from maximizing collocation and/or proximity. Key aspects of this plan include:

**Table 5.49:**
**Comparative Ratings of the Three Land Use Alternatives**

| *Criterion* | *Combined Headquarters* | *Separate Headquarters* | *Combined Headquarters and Instruction* |
|---|---|---|---|
| Equality | 2 | 1 | 3 |
| Use existing, available as originally designed | 2 | 1 | 3 |
| Convert existing, available | 1 | 2 | 3 |
| Traffic flow | 2 | 1 | 3 |
| Future use | 2 | 1 | 3 |
| Proximity of One Station Unit Training billets | 1 | 3 | 2 |
| Proximity of Non-Commissioned Officers Academy billets | 1.5 | 1.5 | 3 |
| Proximity of Officer billets to Applied Instruction Classrooms/Facilities | 2 | 2 | 2 |
| Proximity of Officer billets to General Instruction Classrooms/Facilities | 3 | 1 | 2 |
| Construction costs | 2 | 1 | 3 |
| Site development costs | 2 | 3 | 1 |
| Utility costs | 2 | 1 | 3 |
| Total Rating | 22.5 | 18.5 | 31 |

*Source: Fort Leonard Wood, Directorate of Public Works, Master Planning*

a) The NCO academies from the three separate schools will be combined into one academy at one location;

b) The Leader Training, Combat Development, and Training Development staffs, and the applied instruction Battle Labs will all be consolidated at one location for all three schools;.

c) Training that is common to all three schools will be consolidated. Students from all three Corps (Engineer, Military Police and Chemical) will be trained in shared facilities.

d) Shared training between officer and non-commissioned officer courses will also be conducted.

The benefits to be gained by such consolidation would be an increase in operational efficiency, through:

- reduced administrative staff requirements at the headquarters and NCO Academy;
- reduced administrative staff effort duplication, allowing for more effective use of available staff;
- increased communications between collocated personnel performing similar functions, reducing coordination requirements and streamlining/improving the lines of communication;
- coordinated use of both general and specialized training and support facilities, thereby increasing utilization rates and reducing the need for duplicated facilities;
- increased interaction of Corps staff, where the training is developed with classroom implementation of the training and immediate feedback from the trainers and students, fostering a more cooperative relationship; and
- increased flexibility in assignment of students to billets that are located proximate to the training facilities they will use most frequently, thereby resulting in reduced transportation costs.

In addition, other benefits that are anticipated as a result of implementing this alternative include:

- reduced construction costs associated with items such as parking lots and classrooms that will not be duplicated, when compared to Alternative 1 and Alternative 2; and

- enhancement of the "campus" atmosphere already developed by the presence of the existing Engineer School and adjacent Morelli Heights UPH.
- will allow reuse of an existing dud area for Mark 19 training, reducing the cost of removing dud rounds. Arrangement of Special Reaction Team ranges (13-15) also results in improved synergism effects associated with this training.

Implementation of the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) Alternative will require the construction of eight construction projects. Each of the construction projects has a beneficial long-term impact on the overall operational efficiency of the BRAC activities being relocated to FLW and their functional relationship to existing FLW operations.

## 5.3.2.18 Summary

Table 5.50 summarizes the impacts associated with implementing the Army's Proposed LU & FP (CH&I) locations.

**Table 5.50:**
**Summary of Attributes Associated with Implementing Construction at the Army's Proposed Land Use & Facility Plan (Combined Headquarters and Instruction)**

| Attribute | Positive Attributes | Negative Attributes |
|---|---|---|
| Land Use | Facility sitings are compatible with the FLW land use plan. The location of the combined headquarters and instruction facilities near the Engineer School and Morelli Heights housing enhances the campus setting already established. | |
| Air Quality | | Construction dust will create a minor short term increase in particulate matter |
| Noise | | Construction activity will create a minor short term increase in noise levels |
| Water Resources | | Construction activities will create the potential for short term erosion |
| Geology and Soils | | The potential for soil disturbance at construction sites is 987 acres; there is the potential for significant short term erosion at sites with highly erodible soils. A summary of significant adverse impacts and mitigation is located in subsection 5.5.5. |
| Infrastructure | Required building square footage is approximately 800,000; 50 percent of current FMC requirement. Therefore, overall Army utility requirement should decrease. | Extension of utilities needed to service CDTF and 16-Building MOUT. Traffic congestion near the combined headquarters and instruction facilities will require construction of traffic improvements. |
| Hazardous/Toxic Materials | | Construction activities may use/generate small amounts of hazardous materials/wastes that will be disposed of as prescribed by Federal, state and local regulations |
| Munitions | Not Applicable | |
| Permits/Regulatory Authority | Monitoring through the permit process will be protective of human health and the environment through compliance with the regulations. | The BRAC construction action will require modification of and/or acquisition of additional permits associated with storm water management and potential stream/wetland encroachment. |

**Table 5.50:**
**Summary of Attributes Associated with Implementing Construction at the Army's Proposed Land Use & Facility Plan (Combined Headquarters and Instruction)**

| Attribute | Positive Attributes | Negative Attributes |
|---|---|---|
| Biological Resources | | |
| a. T & E Species | | Loss of habitat will amount to: 0 acres of high quality; 82 acres of moderate quality and 92 acres of low quality of Indiana bat habitat and 3 acres for the gray bat. |
| b. OPS | | Adverse impacts to OPS through the loss, degradation, and increased fragmentation of OPS habitat. |
| c. Wetlands | | Loss of 0.14 acres of wetlands during construction of CDTF. |
| d. Aquatic Resources | | Sediment runoff from construction sites could create short term adverse impacts to aquatic resources. |
| e. Terrestrial Resource | | The potential loss of vegetative cover/habitat amounts to 688 acres. |
| Cultural Resources | No cultural resources will be affected. | |
| Sociological Environment | Construction workers will increase demand for rental units. | |
| Economic Development | There will be a short term benefit to the local economy from the construction activities. | |
| Quality of Life | FLW community facilities will be able satisfy the increased demand resulting from the realignment of personnel to FLW. Collocation of libraries and museums provides better service. | |
| Installation Agreements | There will no impact to installation agreements. | |
| Operational Efficiency | Collocation of Military Police School and Chemical School with Engineer school offers positive interaction and improved training and operating efficiencies; this plan was ranked highest in 9 of 12 operational criteria. | |

Source: Harland Bartholomew & Associates, Inc.

# SUBSECTION 5.3.3

# Analysis of Alternative 1 LU & Fac Plan (Combined HQ)

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.3.3 IMPACTS OF IMPLEMENTING ALTERNATIVE 1 LAND USE AND FACILITY PLAN (Combined Headquarters)

### 5.3.3.1 Introduction

The following analysis focuses on issues associated with the implementation of Alternative 1 Land Use and Facility Plan (Combined Headquarters). Impact Matrix 5, located in Volume II, illustrates the impacts of implementing this land use plan and all related construction projects.

The discussion in subsections 5.3.3.2 thorough 5.3.3.17 is limited to identifying the relative differences between this land use alternative and the Army's Proposed LU & FP (CH&I) as discussed in subsection 5.3.2. A summary of the benefits and impacts associated with implementation of this land use plan is contained in subsection 5.3.3.18.

A modified copy of Table 5.39 has been provided below as Table 5.51 to illustrate the outline of the analysis structure.

**Table 5.51:**
**Matrix Display of Step 2 (Subsections 5.3.2 through 5.3.4) Land Use and Facility Plan Analysis Subsection Numbers**

| Subsection or Impact Analysis Categories | Subsection Numbers - Implementation of the Army's Proposed LU & FP (CH&I) (Subsection 5.3.2) | Subsection Numbers - Implementation of Alternative 1 LU & FP (CH) (Subsection 5.3.3) | Subsection Numbers - Implementation of Alternative 2 LU & FP (SH) (Subsection 5.3.4) |
|---|---|---|---|
| Introduction | 5.3.2.1 | 5.3.3.1 | 5.3.4.1 |
| Land Use & Training Areas | 5.3.2.2 | 5.3.3.2 | 5.3.4.2 |
| Air Quality and Climate | 5.3.2.3 | 5.3.3.3 | 5.3.4.3 |
| Noise | 5.3.2.4 | 5.3.3.4 | 5.3.4.4 |
| Water Resources | 5.3.2.5 | 5.3.3.5 | 5.3.4.5 |
| Floodplains/Surface Water | 5.3.2.5.A | 5.3.3.5.A | 5.3.4.5.A |
| Hydrology/Groundwater | 5.3.2.5.B | 5.3.3.5.B | 5.3.4.5.B |
| Geology and Soils | 5.3.2.6 | 5.3.3.6 | 5.3.4.6 |
| Infrastructure | 5.3.2.7 | 5.3.3.7 | 5.3.4.7 |
| Hazardous/Toxic Materials | 5.3.2.8 | 5.3.3.8 | 5.3.4.8 |
| Munitions | 5.3.2.9 | 5.3.3.9 | 5.3.4.9 |
| Permits/Regulatory Authority | 5.3.2.10 | 5.3.3.10 | 5.3.4.10 |
| Biological Resources | 5.3.2.11 | 5.3.3.11 | 5.3.4.11 |
| Federal T & E Species | 5.3.2.11.A | 5.3.3.11.A | 5.3.4.11.A |
| Other Protected Species | 5.3.2.11.B | 5.3.3.11.B | 5.3.4.11.B |
| Wetlands | 5.3.2.11.C | 5.3.3.11.C | 5.3.4.11.C |
| Aquatic Resources | 5.3.2.11.D | 5.3.3.11.D | 5.3.4.11.D |
| Terrestrial Resources | 5.3.2.11.E | 5.3.3.11.E | 5.3.4.11.E |
| Cultural Resources | 5.3.2.12 | 5.3.3.12 | 5.3.4.12 |
| Sociological Environment | 5.3.2.13 | 5.3.3.13 | 5.3.4.13 |
| Economic Development | 5.3.2.14 | 5.3.3.14 | 5.3.4.14 |
| Quality of Life | 5.3.2.15 | 5.3.3.15 | 5.3.4.15 |
| Quality of Life | 5.3.2.15.A | 5.3.3.15.A | 5.3.4.15.A |
| Human Health and Safety | 5.3.2.15.B | 5.3.3.15.B | 5.3.4.15.B |

| Table 5.51: Matrix Display of Step 2 (Subsections 5.3.2 through 5.3.4) Land Use and Facility Plan Analysis Subsection Numbers | | | |
|---|---|---|---|
| **Subsection or Impact Analysis Categories** | **Subsection Numbers - Implementation of the Army's Proposed LU & FP (CH&I) (Subsection 5.3.2)** | **Subsection Numbers - Implementation of Alternative 1 LU & FP (CH) (Subsection 5.3.3)** | **Subsection Numbers - Implementation of Alternative 2 LU & FP (SH) (Subsection 5.3.4)** |
| Installation Agreements | 5.3.2.16 | 5.3.3.16 | 5.3.4.16 |
| Operational Efficiency | 5.3.2.17 | 5.3.3.17 | 5.3.4.17 |
| Summary | 5.3.2.18 | 5.3.3.18 | 5.3.4.18 |
| *Source: Harland Bartholomew & Associates, Inc.* | | | |

## 5.3.3.2 Land Use & Training Areas

Implementation of Alternative 1 Land Use and Facility Development Plan (Combined Headquarters) will result in the modification of existing land use for five land use zones within the cantonment, including:

- conversion of a troop housing area at the northern end of the 600-area barracks to administrative use;
- conversion of a troop housing area along the western side of the 1000-area barracks to administrative use;
- conversion of an industrial area southwest of the intersection of Alabama and South Dakota avenues to training;
- conversion of an approximately 400-foot by 100-foot (120 meter by 30 meter) area near the intersection of East Fourth Street and Louisiana Avenue from reserved buffer to industrial; and
- adjustment of the existing Buffer area between the industrial area and the troop housing area near the intersection of Oklahoma Avenue and East Fourth Street to provide isolation of the expanded industrial area (from the line above).

These area are illustrated on Figure 3.4, Alternative 1 BRAC Land Use Plan (Combined Headquarters) which is located in Section 3 of the EIS. Construction sites that will be used for construction of the new instructional areas, headquarters, libraries, museums and storage areas for the Military Police School and Chemical School are illustrated on Figure 3.5, Alternative 1 BRAC Facility Siting Plan (Combined Headquarters).

**5.3.3.2.1 General Officers Quarters (Project 38174).** As discussed in subsection 5.3.2.2.1, the construction of this project northwest of Piney Hills Drive will not have any direct or indirect impacts on Land Use or Training Areas. Therefore the impact will be the same as discussed in subsection 5.3.2.2.1.

**5.3.3.2.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Under this alternative this project has been located southwest of the 800-area barracks, south of South Dakota Avenue and west of Artillery Circle.

- **Direct Impacts.** The area designated for this project was designated for Industrial land uses in the FLW Master Plan (FLW, 1991c). Consequently, construction of a MOUT in this area will require the land use reclassification of approximately 27 acres (11 hectares) in this area to Training. Conversion of the area to a training land use would be an adverse impact. The type of training that will be accomplished this training area would be incompatible with troop housing areas located immediately northeast of the training area.

- **Indirect Impacts.** Location of this training area in the area designated will result in the use of blank ammunition and smoke grenades within the cantonment. These training activities would have a long-term adverse impact on surrounding functions.

**5.3.3.2.3 Chemical Defense Training Facility (Project 45893).** As discussed in subsection 5.3.2.2.3, the location of this project will occur within an area that is designated for Training. Consequently, the construction of this project will not require the modification of the existing land use. Construction of the CDTF will be north of TA 236, near Range 33, in an area not currently identified as a formal training area. There will no direct or indirect land use or training areas concerns associated with proposed construction site.

**5.3.3.2.4 General Instruction Facility (Project 46090).** Construction of the General Instruction Facility (Project 46090) will consist of interior renovations at Hoge, Lincoln and Clarke halls; construction of a new building north of Lincoln Hall; renovation of a "rolling pin" barracks for Base Operations Administrative Support, reallocation of areas with Clarke Hall library, General Leonard Wood Army Community Hospital, and unit administrative areas at Specker Barracks, and the renovation of 1000-area "rolling pin" barracks. Renovation of 1000-area "rolling pin" barracks will provide classroom and administrative areas for the Chemical and Military Police NCOA. The interior reallocation of areas and new construction in the area of Hoge, Lincoln and Clarke halls will provide administrative, classroom and support spaces for the headquarters staffs and for Officer training.

- **Direct Impacts.** As discussed in subsection 5.3.2.2.4, construction north of Lincoln Hall will occur within an area designated for Administration. The nature of the facility which will be constructed is consistent with the existing training and administrative functions located in the area. Construction of this project will not require the relocation of any existing training areas. Reallocation of the existing areas within Hoge, Lincoln, and Clarke halls, General Leonard Wood Army Community Hospital, and Specker Barracks are all consistent with the existing uses.

  Implementation of this alternative will reduce the beneficial impacts of collocating the three schools by requiring the duplication of support facilities for the NCOA that could be collocated with the Officer facilities. Additionally under this land use plan the NCOA will not be proximate to the proposed library facilities, resulting in lost time and inconvenience as personnel commute between the library, billets and classroom facilities, and increasing intra-post traffic.

- **Indirect Impacts.** The distance between the NCOA and the library facilities may create difficulties of travel time and transportation for students.

**5.3.3.2.5 Applied Instruction Facility (Project 46091).** As discussed in subsection 5.3.2.2.5, the Applied Instruction Facility construction package includes construction for five diverse functions. Under this land use plan, these functions will include construction or renovation as discussed below.

1) Renovation of Building 5265 and construction of a new maintenance facility west of the 800-area barracks for use by the 11th Chemical Company (Smoke/Decon) and the 20th Chemical Detachment (BIDS). Building 5265 is the existing DOL Vehicle Maintenance Facility and has available requisite capacity to support vehicle maintenance, maintenance training and organizational vehicle parking. Part of the available area will be renovated and used for BIDS and FOX vehicle maintenance and maintenance instruction. The remainder of the area will be used for the maintenance of other vehicles relocated to FLW as part of the proposed action. Exterior parking areas near Building 5265 will be used for organizational vehicle parking. Vehicles from the 11th Chemical Company and the 20th Chemical Detachment will be maintained and parked in a new maintenance facility constructed in the Industrial land use area west of the 800-area barracks. Both of these uses are consistent with the existing Master Plan (FLW, 1991c).

2) Warehousing will be provided through the construction of a new warehouse in the area near the intersection of East Fourth Street and Louisiana Avenue.

3) Construction of an addition to Walker Museum to house the collections of the U.S. Army Military Police Museum and the U.S. Army Chemical Museum.

4) Construction of a DATF south of the 1000-area and east of Artillery Circle. The DATF will include applied and general instruction classrooms, covered and uncovered exterior training areas, administrative areas and storage areas.

5) Construction of a Military Police Patrol Incidents Training Area (MP Village) southwest of the intersection of South Dakota and Alabama avenues. The MP Village area will include applied and general instruction classrooms, covered and uncovered exterior training areas, administrative areas and storage areas.

- **Direct Impacts.** The use of existing, available area at Building 5265 will not require any modification to the existing land use pattern.

  The eastern edge of the storage warehouse construction site is located within an Industrial area, but an additional area (approximately 1 acre (0.4 hectares) ) would need to be reclassified from Reserved/Buffer and Troop Housing to Industrial to allow for siting of the new warehouse. This buffer would be shifted westward so that it would run along the western side of Oklahoma Avenue. As a result of the shift of the reserved/buffer area, the amount of area available for future troop housing expansion in the "old" 1900-area will be reduced. Also required is the conversion of troop housing areas at the northern end of the 600-area barracks (approximately 21 acres (8 hectares)) and along the western side of the 1000-area barracks (approximately 15 acres (6 hectares)) to Administrative use. The addition to Walker Museum will require the conversion of approximately 3 acres **(1.2 hectares)** of the existing recreation area to community facilities land use northeast of the intersection of Jordan Road and South Dakota Avenue. This conversion will have no impact on other installation functions.

  Construction of both the DATF and MP Village will require conversion of approximately 10 acres (4 hectares) of existing Industrial area to Training. These two new training facilities will be consistent with the existing character of the area, resulting in no impact.

- **Indirect Impacts.** Collocation of vehicle maintenance, vehicle parking, warehousing and artifact storage activities will have a long-term beneficial impact based on the potential for reduced maintenance and personnel requirements. Construction of both the DATF and MP Village will place these facilities proximate to the proposed billeting (in the 600- through 800-area barracks) for the students who will use these facilities most often. This will result in a beneficial impact from reduced transportation costs and lesser time delays.

**5.3.3.2.6 Unaccompanied Personnel Housing (Project 46092).** This land use plan provides for new construction of 1,750 spaces. This construction will be south of the 800-area and south of Specker Barracks. There will be no impact since this construction will take place in areas currently designated for Troop Housing.

**5.3.3.2.7 Range Modifications (Project 46094).** As discussed in subsection 5.3.2.2.7, construction at the various range sites will not have an impact on Land Use. Each of these facilities is located within an area that has been designated for this type of activity.

**5.3.3.2.8 Convert Housing (Project 46640).** Implementation of this land use plan will incorporate new construction next to Morelli Heights. This land use is consistent with the existing land use in that area.

## 5.3.3.3 Air Quality and Climate

The following issues related to air quality and climate have been identified with the implementation of the proposed action at Fort Leonard Wood.

- Particulate Emissions From Construction Activities; and
- Air Emissions From Utilities

**5.3.3.3.1 Issue: *Particulate Matter Emissions From Construction Activities.*** It is not anticipated that implementation of this Alternative would result in different direct or indirect impacts on air quality than as described in the Combined Headquarters and Instruction Alternative (subsection 5.3.2.3).

**5.3.3.3.2 Issue: *Air Emissions From Utilities.*** This alternative will result in an increase in air emissions compared to the Combined Headquarters and Instruction Alternative because of the increase in energy requirements. The energy requirement increase can be approximated by proportioning either the square footage or the number of personnel in the case of Unaccompanied Personnel Housing. The air emissions are directly proportional to the energy requirements.

## 5.3.3.4 Noise

Several actions related to the BRAC realignment have the potential to create noise impacts. These include:

- construction activities and
- noise from traffic near the Lincoln Hall, Hoge Hall, and Clarke Hall complex following completion of the General Instruction Facility construction project.

**5.3.3.4.1 Issue: *Construction Activities.*** General construction associated with thee projects will have a direct short-term adverse impact during construction activity. The construction noise will be transient and for the most part confined to daylight hours. See the discussion of impacts at subsection 5.3.2.4.1. Construction locations that will increase noise levels include those illustrated on Figure 3.5, Alternative 1 BRAC Facility Siting Plan (Combined Headquarters) located in subsection 3.4.2.

### 5.3.3.4.2 Issue: *Traffic Near the Lincoln, Hoge and Clarke Hall Complex*

- **Indirect Impacts.** The effects of noise generated by vehicular traffic will be determined by traffic travel routes and the number of trips required. This alternative will reduce the number and type of functions that will be consolidated north of Lincoln Hall, consequently this alternative will not result in the same level of additional traffic in the area near Hoge, Lincoln and Clarke halls. Therefore, vehicle noise impacts resulting from this alternative can be expected to be less than those described in subsection 5.3.2.4.2.

## 5.3.3.5 Water Resources

This section examines the potential effects of the construction activities on the water resources within the installation. As described in Section 3, there are three components of the proposed action. The following paragraphs identify and describe issues associated with the construction packages that may impact water resources. The discussion has been divided into two parts: surface water and floodplains (subsection 5.3.3.5.A) and hydrogeology/groundwater (subsection 5.3.3.5.B).

Environmental controls will be followed during construction and training activities in order to limit the potential of erosion at construction and training areas. A listing of Construction Environmental Controls is located in subsection 5.1.4.2, while a listing of Training Activity Environmental Controls is located in subsection 5.1.4.2.

None of the projects are located in any regulatory floodway. Training goals with projects in floodplain areas include: TG 7.3 Obscurant Employment Operations (Mobile); TG 7.4 Obscurant Employment Operations (Field); and TG 7.6 Obscurant Storage Operations. The facilities to be constructed include parking lots and roadways. No direct or indirect adverse impacts will occur.

Hasty decontamination training sites were selected upstream from stormwater monitoring sites included within NPDES Permit No. MO-0117251. Table H.1 in Volume III, Appendix H of the EIS specifies the location, frequency and types of items that will be monitored for in stormwater.

## 5.3.3.5.A Surface Water and Floodplains

See the discussion in subsection 5.3.2.5.A. Construction activities from Alternative 1 LU & FP (CH) could disturb approximately 1,053 acres (421 hectares) of the FLW installation. Approximately 83 percent of this acreage is currently undeveloped and covered with vegetation such as trees, brush or grassland. The remaining 17 percent of the project area is currently developed or improved including roads, parking lots, buildings, developed training ranges or other disturbed areas. The acreage associated with the individual construction packages are discussed in subsections 5.3.3.5.A.1 through 5.3.3.5.A.8. Direct impacts to soils are discussed in subsection 5.3.3.6.

All construction projects will include the use of Construction Environmental Controls to eliminate or reduce short-term and long-term impacts and to ensure compliance with Federal, state and local regulations, including Missouri Clean Water requirements, at FLW.

- **Indirect Impacts.** See subsection 5.3.2.5.A.

**5.3.3.5.A.1 General Officers Quarters (Project 38174).** The General Officers Quarters will be constructed at the same site under each of the three land use alternatives. Therefore the impact will be the same as discussed in subsection 5.3.2.5.A.1.

**5.3.3.5.A.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Construction activities associated with the Alternative 1 LU & FP (CH) would involve the renovation of an existing facility. Construction activities associated with the renovation of an existing structure would not disturb soils or increase the amount of impervious surfaces. Thus, no impact to surface waters would be anticipated.

**5.3.3.5.A.3 Chemical Defense Training Facility (Project 45893).** Under this construction package, approximately 27 acres (11 hectares) of land could be disturbed under the Alternative 1 LU & FP (CH). Twenty-five of the acres disturbed are considered to be within a vegetated area and could increase the potential for erosion and sediment runoff. Runoff would enter Roubidoux Creek through Smith Branch. The construction of this package could convert a substantial portion of the undeveloped area to an impervious surface. Storm water runoff would be discharged into existing stream channels which are not located within 0.25 miles (0.4 km) of the project site. Stormwater would be retained within a sediment control pond prior to discharging into stream channels.

**5.3.3.5.A.4 General Instruction Facility (Project 46090).** This construction package involves the use of existing structures and the construction of a new facility. Construction activities associated with the use of an existing structure would not disturb soils or increase the amount of impervious surfaces. Thus, no impact to surface waters would be anticipated. However, the construction of a new facility could disturb approximately 55 acres (22 hectares) of land. Roughly half of this area is considered to be undeveloped which increases the potential for erosion and sediment runoff. A substantial portion of the undeveloped area could be converted to an impervious surface. As a result infiltration would be decreased and storm water runoff would increase. Under this package, construction activities would not take place within 0.25 miles (0.4 km) of a surface waterbody.

**5.3.3.5.A.5 Applied Instruction Facility (Project 46091).** This construction package involves the use of existing structures and the construction of new facilities. Construction activities associated with the use of an existing structure would not disturb soils. Thus, no impact to surface waters would be anticipated. However, the construction of new facilities could disturb 74 acres (30 hectares) of land (80 percent more than the Army's Proposed LU & FP (CH&I)). Roughly 70 percent of this area is considered to be a vegetated area which increases the potential for erosion and sediment runoff. A substantial portion of this vegetated area could be converted to an impervious surface. As a result infiltration would be decreased and storm water runoff would increase. The construction of the Chemical School Applied Instruction building (sites 1-13 and 1-8) would occur within 0.25 miles (0.4 km) of existing storm drainage channels.

**5.3.3.5.A.6 Unaccompanied Personnel Housing (Project 46092).** Under the Alternative 1 LU & FP (CH), this construction package could disturb 130 acres (52 hectares) of land (approximately 67 percent more than the Army's Proposed LU & FP (CH&I)). Of this area, approximately 88 percent is considered to be undeveloped. In comparison to the Army's Proposed LU & FP (CH&I), the quantity of undeveloped land disturbed is increased. Therefore, impacts to surface waters could be increased. Runoff from the construction site would enter Dry Creek, through existing storm drainage channels. These channels are located within 0.25 miles (0.4 km) of the project site. This package would include the construction of a storm water detention basin. A substantial portion of the undeveloped land could be converted to an impervious surface. As a result infiltration would decrease and storm water runoff would increase.

**5.3.3.5.A.7 Range Modifications (Project 46094).** Under this construction package, several ranges would undergo modifications. These modifications involve a variety of existing ranges and the construction of new training areas. Overall a total of 757 acres (303 hectares) of land could be disturbed within the Big Piney River and Roubidoux Creek drainage areas. Of these 757 acres of land, 86 percent is undeveloped. Range modifications generally involve earth movement and clearing. A substantial amount of the undeveloped land would remain as a pervious surface. Infiltration would continue and an increase in the magnitude of storm water is not anticipated. Substantial projects within the package include the following:

Big Piney River Drainage Area

- FOX Familiarization, 45 acres (18 hectares) disturbed (McCourtney Hollow); and
- Special Reaction Team Familiarization and Qualification, 44 acres (18 hectares) disturbed (McCourtney Hollow);

Roubidoux Creek Drainage Area

- Evasive Driving, 78 acres (31 hectares) disturbed (Smith Branch);
- Flame Field Expedient Deterrents Training Area, 85 acres (34 hectares) disturbed (McCann Hollow);
- M60/M240 Familiarization and Qualification, 45 acres (18 hectares) disturbed (Bailey Hollow);
- Mark 19 Familiarization and Qualification, 322 acres (129 hectares) disturbed (Mush Paddle Hollow);
- Mobile Smoke Training, 18 acres (7 hectares) disturbed (Ballard Hollow); and
- Special Reaction Team Marksman/Observer, 44 acres (18 hectares) disturbed (Smith Branch).

Many of the project sites that will be used under this land use plan are located within 0.25 miles (0.4 km) of existing storm channels or surface water bodies. These sites include:

- 1-5 FFE deterrent training range;
- 1-6 NBC Warning and Reporting field/maneuver area (storm drainage);
- 1-9 Fox Vehicle Amphibious field/maneuver training area;
- 1-10 Chemical Defense Training Facility;
- 1-12 Obscurant, Employment Operations, Basic (Static) training area;
- 1-13 Obscurant, Employment Operations, Field and Mobile training area;
- 1-14 Obscurant, Employment Operations, Field and Mobile training area;
- 1-15 Obscurant, Employment Operations, Field and Mobile training area;

- 1-16 Obscurant, Employment Operations, Field and Mobile training area;
- 1-17a Obscurant, Storage Operations;
- 1-21 Marine NBC training area (storm drainage);
- 1-22 Marine Shotgun range;
- 1-23 Mark 19 Familiarization and Qualification range;
- 1-25 Special Reaction Team Marksman/Observer range;
- 1-26 Special Reaction Team range (storm drainage);
- 1-28 Range Control, administrative addition;
- 1-29 Relocate Range 29 (storm drainage);
- 1-30 Relocate Range 30 Day/Night;
- 1-33 Relocate Zero Five (M16) range (storm drainage);
- 1-34 9 mm Pistol (Fire Arms Training Simulator) (storm drainage);
- 1-35 Marine 9 mm range;
- 1-36 Marine Combat Pistol range;
- 1-37 HMMWV Driving training area; and
- 1-53 UOPH, new construction (storm drainage).

The Mark 19 Familiarization and Qualification range is of particular concern, because under the Alternative 1 LU & FP (CH), the range will be located near the Cannon Range in Mush Paddle Hollow. Since 98 percent of this area is covered with timber, clearing and habitat degradation associated with construction operations could impact surface waters. To reduce this impact a detention basin should be constructed to collect runoff from the site.

The construction activities associated with the mobile smoke training areas could impact over 18 acres (7 hectares) of land. This package includes detention basins sized to accommodate the additional runoff from road construction and widening. The mobile smoke training area in Ballard Hollow presents a concern for surface waters, because of an unimproved stream crossing on Roubidoux Creek. The affected portion of Roubidoux Creek is within a losing section of stream that is normally dry. Impacts to surface waters can be minimized by restricting or eliminating access to the creek when there is flowing water.

**5.3.3.5.A.8 Convert Housing (Project 46640).** This construction package involves the use of existing structures and the construction of a new facility. Construction activities associated with the use of an existing structure would not disturb soils or increase the amount of impervious surfaces. Thus, no impact to surface waters would be anticipated. However, the construction of a new facility could disturb 9 acres (4 hectares) of land, 78 percent of which is vegetated. Runoff from the construction site would enter Dry Creek, a tributary of the Big Piney River. A substantial portion of the undeveloped area could be converted to an impervious surface. As a result infiltration would be decreased and storm water runoff would increase. Under this package, construction activities would not occur within 0.25 miles (0.4 km) of a surface waterbody

## 5.3.3.5.B Hydrogeology/Ground Water

Implementation of the planned BRAC construction packages at FLW under the Alternative 1 LU & FP (CH) will result in similar impacts to ground water as those noted in subsection 5.3.2.5.B. Differences with respect to the Army's Proposed LU & FP (CH&I) are discussed below. The major difference between the Land Use alternatives is in the number of acres that could be impacted and the amount of this area with a high potential for soil erosion. As with the Army's Proposed LU & FP (CH&I), impacts to ground water are indirect and are of insignificant magnitude. Surface water monitoring (see Volume III, Appendix H), will ensure that water runoff meets all applicable standards.

**5.3.3.5.B.1 General Officers Quarters (Project 38174).** The General Officers Quarters will be constructed at the same site under each of the three land use alternatives. Therefore the impact will be the same as discussed in subsection 5.3.2.5.B.1.

**5.3.3.5.B.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Under the Alternative 1 LU & FP (CH), this package will consist of a renovation of existing facilities, augmented by new construction, no impact to ground water is anticipated.

**5.3.3.5.B.3 Chemical Defense Training Facility (Project 45893).** Construction of the Chemical Defense Training Facility will take place south of Forney Airfield under the Alternative 1 LU & FP (CH). This construction could impact approximately 27 acres (11 hectares). The location selected for the facility lies near an identified linear trend of sinkholes.

**5.3.3.5.B.4 General Instruction Facility (Project 46090).** Under the Alternative 1 LU & FP (CH), approximately 55 acres (22 hectares) could be disturbed for new construction contained in the General Instruction Facility (Project 46090). The location of the disturbance will be the same as under the Army's Proposed LU & FP (CH&I), therefore impacts will be the same as in subsection 5.3.2.5.B.4.

**5.3.3.5.B.5 Applied Instruction Facility (Project 46091).** This construction package in the Alternative 1 LU & FP (CH) entails the construction of several facilities, the larger of which are in the south portion of the cantonment area as well as renovation of existing buildings. The renovations will not disturb soils and will not impact ground water. The construction of the new facilities could disturb 74 acres (30 hectares). The new facilities will be in the vicinity of several identified sinkholes.

**5.3.3.5.B.6 Unaccompanied Personnel Housing (Project 46092).** This construction, under the Alternative 1 LU & FP (CH), could disturb approximately 130 acres (52 hectares) in the southern portion of the cantonment area. Several sinkholes identified on Figure 4.7 are located near the site of the construction.

**5.3.3.5.B.7 Range Modifications (Project 46094).** Under the Alternative 1 LU & FP (CH) a number of ranges would undergo modifications. This package includes modification to a number of existing ranges as well as the establishment of several new training areas. Approximately 757 acres (303 hectares) could be impacted as a part of this package. Most of the range modification are in the southern portion of the base, where sinkholes are less common. In addition, many of the areas have previously been disturbed through training activities associated with the existing mission at FLW.

**5.3.3.5.B.8 Convert Housing (Project 46640).** This construction package involves the renovation and reuse of existing structures.

## 5.3.3.6 Geology and Soils

This section examines the potential effects of the construction activities on the soil and geology at the installation under the Alternative 1 LU & FP (CH). This section will only consider the differences of this land use plan relative to the Army's Proposed LU & FP (CH&I). Soil erosion controls will be utilized to minimize the potential for soil erosion during construction, as described in subsection 5.5.1.2.

**5.3.3.6.1 General Officers Quarters (Project 38174).** The construction for this package is the same for each of the land use plans. Impacts are discussed in subsection 5.3.2.6.1.

**5.3.3.6.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Under the Alternative 1 LU & FP (CH), this package would be a renovation to existing facilities. Therefore there would be no impact to soils.

**5.3.3.6.3 Chemical Defense Training Facility (Project 45893).** Under the Alternative 1 LU & FP (CH) the CDTF will be constructed on a site of approximately 27 acres (11 hectares). This would cause a direct adverse impact to soils. The impacts of this package are similar to those under the Army's Proposed LU & FP (CH&I).

**5.3.3.6.4 General Instruction Facility (Project 46090).** Under the Alternative 1 LU & FP (CH) one new facility will be constructed, which could impact approximately 55 acres (22 hectares). The construction would be the same size, and would be located at the same site as under the Army's Proposed LU & FP (CH&I). Therefore the impact will be the same as in subsection 5.3.2.6.4.

**5.3.3.6.5 Applied Instruction Facility (Project 46091).** Approximately 74 acres could be disturbed as a result of the construction of 5 projects for this package under the Alternative 1 LU & FP (CH). This is an increase over the area to be disturbed under the Army's Proposed LU & FP (CH&I). In addition, approximately 9 acres (4 hectares) under this land use plan will be located in areas with steep slopes which will have a relatively high potential for soil erosion. Construction of the Chemical and Military Police OSUTs and the Vehicle Maintenance Cantonment would result in direct adverse impacts to soils.

**5.3.3.6.6 Unaccompanied Personnel Housing (Project 46092).** Under the Alternative 1 LU & FP (CH), approximately 130 acres (52 hectares) could be disturbed during the construction of this package. Approximately 8 acres (3 hectares) of this could be in areas with a high potential for soil erosion. The impacts of this package under the Alternative 1 LU & FP (CH) will be of lesser magnitude than the impacts under the Army's Proposed LU & FP (CH&I), which has a greater number of acres with high soil erosion potential, but a significantly smaller number of total acres impacted. Under the criteria listed in subsection 5.3.2.6, this would result in a direct adverse impact to soils.

**5.3.3.6.7 Range Modifications (Project 46094).** The Range Modifications (Project 46094) could impact approximately 757 acres under the Alternative 1 LU & FP (CH). Approximately 201 acres (80 hectares) could be in areas with steep slopes and a resulting high erosion potential. This compares to approximately 775 acres (310 hectares), 117 acres (47 hectares) with a high soil erosion potential, under the Army's Proposed LU & FP (CH&I). There will be a greater impact under this land use alternative as a result of the larger amount of land with a higher potential for erosion. The following projects will result in an adverse impact to soils:

- Base Recovery, project site 1-30 could disturb approximately 6 acres (2 hectares);
- Construction of the Evasive Driving Course, could disturb approximately 78 acres (31 hectares) with relatively low slopes;
- FOX Familiarization may disturb approximately 45 acres (18 hectares);
- Mobile Smoke Training near Babb Airfield could disturbed approximately 10 acres (4 hectares);
- Special Reaction Team Familiarization and Qualification may disturb approximately 44 acres (18 hectares);
- Special Reaction Team Marksman/Observer could disturb approximately 44 acres (18 hectares);
- Static Smoke Training may disturb approximately 12 acres (5 hectares);
- Relocation of Range 29 could disturb approximately 15 acres (6 hectares); and
- Relocation of Range 30 D/N could disturb approximately 22 acres (9 hectares);

The following projects will result in direct significant adverse impacts to soils:

- Flame Field Expedient Deterrents Training may disturb 85 acres (34 hectares), 28 acres (11 hectares) with high soil erosion potential;
- M60/M240 Familiarization and Qualification may disturb approximately 45 acres (18 hectares) , 24 acres (10 hectares) with high soil erosion potential;
- Mark 19 Familiarization and Qualification could disturb approximately 322 acres (129 hectares) , 122 acres (49 hectares) with high soil erosion potential; and
- Mobile Smoke Training at Ballard Hollow could result in the disturbance of 18 acres (7 hectares) with a high soil erosion potential.

A summary discussion of adverse impacts is provided in subsection 5.5.1.3.

**5.3.3.6.8 Convert Housing (Project 46640).** This package consists of modification to existing facilities under each of the land use alternatives. Therefore there will be no impact to soils.

## 5.3.3.7 Infrastructure

The following issues related to the infrastructure systems at FLW have been identified with the implementation of the Alternative 1 LU & FP (CH):

- Availability and adequacy of existing utility service connections;
- Energy demand; and
- Traffic volume and concentration.

### 5.3.3.7.1 Issue: *Availability and Adequacy of Existing Utility Service Connections.*

As discussed in subsection 5.2.2.7, the system capacities of FLW utilities are adequate to serve the anticipated increase in population. New facilities, in previously undisturbed areas, may require that new utility service connections be extended to the sites. Increases in the utility requirements for specific areas on the installation may exceed the capacity of utility lines that currently service those areas. Therefore the estimated utility demand from new facilities must be considered for the impact they may have on existing lines. Under the Alternative 1 LU & FP (CH), the new CDTF and new Evasive Driving Training Area would require extensive extension and upgrade of existing utilities (Figure 3.5).

- **Direct Impact** The CDTF (Project 45893) construction site is located approximately 2 miles (3 kilometers) southwest of the cantonment area. Water service would require a new groundwater well be constructed on site. To have sufficient water for fire fighting, two water storage tanks would be needed on the site. Connecting the facility to the installation's sewer system would require approximately 1.5 miles (2.4 kilometers) of new gravity and force main sewers to reach the sewage system currently serving the cantonment area. Natural gas for heating and operation of the autoclave would require upgrade of the natural gas line servicing the southern portion of the cantonment area as well as approximately 1.5 miles (2.4 kilometers) of a new service line from the cantonment area. New electrical service would require upgrading approximately 1.5 miles of existing lines and adding approximately 0.7 miles (.3 kilometers) of new service lines. These actions would create a short-term adverse impact associated with construction of the CDTF.

  Under the Alternative 1 LU & FP (CH), the Evasive Driving Training is located approximately 2.5 miles (1 kilometer) southwest of the cantonment area . At this location, the training area would utilize and benefit from portions of the utility improvements made for the CDTF. An additional 1.5 miles (2.4 kilometers) of sewer and gas lines would be required. Approximately 0.7 miles (.3 kilometers) of electrical service would need upgraded, and approximately 0.8 miles of new electrical service would be needed. Therefore, a short-term adverse impact is anticipated for this training area.

- **Indirect Impact** A long-term indirect impact would occur as a result of constructing the CDTF. A new lift station in the vicinity of the southwest end of the airfield would be required to convey sewage from the CDTF to the cantonment area where gravity flow sewer lines carry sewage to the FLW wastewater treatment plant.

### 5.3.3.7.2 Issue: *Energy Usage.*

The increase in effective population and the increase in the number facilities at FLW will result in an increase in the energy consumption by the installation. As described in subsection 5.3.2.7, the utility systems have the capacity to handle the increased demands of the added square footage.

- **Direct Impact** FLW currently has approximately 11.7 million square feet of facilities requiring heating and cooling. Under the Alternative 1 LU & FP (CH), approximately 1.1 million square feet of new facilities will be constructed. To minimize the increase in energy demand, the new facilities and any existing facilities renovated will meet the energy standards of AR 11-27. Energy policies specific to FLW are contained in Supplement 1 to AR 11-27 (FLW, 1992a). New facilities would be required to adopt and abide by these same policies. Therefore, the increase in energy usage

associated with the relocation of the Military Police School and Chemical School to FLW is not anticipated to have an adverse impact on the environment.

- **Indirect Impact** The Military Police School and Chemical School operate within facilities totalling approximately 1.6 million square feet at FMC. When relocated to the new facilities at FLW, the amount of square footage requiring electrical service, heating and cooling will be reduced by approximately 30 percent. In addition, the new facilities will be designed to current standards to conserve energy. Therefore, energy demand for the operation of the Military Police School and Chemical School will be reduced when they are relocated to FLW, resulting in an overall long-term beneficial indirect impact.

**5.3.3.7.3 Issue: *Traffic Volume and Concentration.*** Implementation of the Alternative 1 LU & FP (CH) will result in a dispersion of activity across the cantonment area. This dispersion of activity will also distribute automobile traffic throughout the cantonment area. No significantly adverse impacts on traffic within the cantonment are expected to result. Implementation of the proposed action will require the repair, expansion and modernization of several roads and road segments within the range and training areas.

- **Direct Impact.** Repair, expansion and modernization of several roads and road segments within the range and training areas improve the existing roadway infrastructure. These repairs, expansions and modernization will be accomplished as part of additional maintenance as a part of the Range Modifications (Project 46094) construction project.

- **Indirect Impact.** The repair, expansion and modernization of roads and road segments near the ranges ad training areas will result in improved (routine and emergency) access to these areas. All of the roads and road segments near the range and training areas are designed for restricted access and are not used by through traffic, consequently the utility of the improved access will be limited.

## 5.3.3.8 Hazardous and Toxic Materials

Implementation of the Alternative 1 LU & FP (CH) will result in the following issues related to hazardous and toxic materials used at FLW.

- Use of hazardous materials during construction; and
- Construction on contaminated sites.

**5.3.3.8.1 Issue: *Use of Hazardous Materials During Construction.*** As described in subsection 5.3.2.8, no adverse impact is anticipated as a result of contractors using hazardous materials during the course of construction activities.

**5.3.3.8.2 Issue: *Construction on Contaminated Sites.*** Sites for new facility construction projects were selected to avoid disturbance of any known contaminated sites requiring remediation through the Installation Restoration Program or the Installation Action Plan. In 1982 and 1987 the Army conducted assessments to locate and identify areas on the installation with the potential for hazardous substance contamination. These assessments were also used by USEPA in preparing a Facility Assessment in 1992 and by FLW in preparing the Installation Action Plan which identifies areas requiring remediation. These surveys area used during Installation Master Planning to avoid siting facilities in areas where contamination may exist. Types of sites identified as having the potential for contamination including Firefighting Training Areas, landfills, and hazardous waste temporary storage areas. Funding for remediation is programmed through the Army's Installation Restoration Program.

None of the BRAC 95 facilities area proposed for areas identified in the surveys as having the potential for contamination requiring remediation through the Installation Restoration Program. In April 1996, the FLW, Directorate of Public Works, Environmental, Energy, and Natural Resources Division completed a

Preliminary Assessment Screening (PAS) of all sites proposed for utilization under the each of three alternative land use and facility plans (FLW, 1996i) as a final clearance check. The PAS **did not identify any sites** included in the Installation Action Plan or which require remediation through the Installation Restoration Program.

The PASs indicated that, because many of the sites specified use under this land use plan have been used for other uses in the past, the proposed construction sites may be a potential that oil products, munitions, asbestos or underground storage tanks may have been located at the area within the sites specified for reuse: however; none of these properties would qualify for the Installation Action Plan or the Installation Restoration Plan. Facilities at these sites that are known to contain asbestos (or asbestos containing materials) have been clearly marked. Normal procedures during construction should eliminate the potential for contamination from these sites. Sites and the potential contaminate include:

- Vehicle Maintenance, Cantonment (1-56) (which is part of the Applied Instruction Facility (Project 46091) construction project) which is located in an area where oil products were used;
- Flame Field Expedient Deterrent Training Area at Range 27 (1-5) (which is part of the Range Modifications (Project 46094) construction project) which is located in an area where munitions were used;
- M60/M240 Familiarization and Qualification at Range 27 (1-20); (which is part of the Range Modifications (Project 46094) construction project) which is located in an area where munitions were used;
- Mark 19 Familiarization and Qualification at Cannon Range (1-23) (which is part of the Range Modifications (Project 46094) construction project) which is located in an area where munitions were used; and
- Administration, Base Operations at renovated 600 area barracks (1-51) which is located in an area where facilities contained asbestos or asbestos containing materials;
- Chemical School NCO Instruction at renovated 1000 area barracks (1-48) which is located in an area where facilities contained asbestos or asbestos containing materials;
- Unaccompanied Personnel Housing, Enlisted south of 800 area and south of Specker Barracks (1-46a) which is located in an area where facilities contained asbestos or asbestos containing materials;
- Military Police School NCO Instruction at renovated 1000 area barracks (1-2) which is located in an area where facilities contained asbestos or asbestos containing materials;
- Military Police School Office Instruction north of Lincoln Hall (1-42) which is located in an area where facilities contained asbestos or asbestos containing materials;
- Military Police OSUT (1-4) which is located in an area where facilities contained asbestos or asbestos containing materials; and
- 16-Building MOUT at renovated barracks (1-7) which is located in an area where facilities contained asbestos or asbestos containing materials.

The construction contractor would be made aware of the prior use of these sites. Precautions would be required by the contractor to prevent contamination if disturbance of these areas is necessary. FLW currently has well defined ongoing programs to monitor and remove USTs and asbestos containing material. The proposed construction projects will expedite removal of USTs and asbestos containing material. Therefore, a short-term beneficial impact would result from the earlier removal of the USTs and asbestos containing material.

## 5.3.3.9 Munitions

The following issues related to the Munitions at FLW have been identified with the implementation of the Army's Proposed LU & FP (CH&I).

- Quantity of munitions used; and
- Creation of new range impact and dud areas.

**5.3.3.9.1 Issue: *Quantity of munitions used.*** Implementation of the Alternative 1 LU & FP (CH) is not anticipated to have an impact associated with munitions used at or brought to FLW. Munitions will be discharged on ranges designated for their use. As described in subsection 5.3.3.2, the Range Modification project sites will be located within areas designated for such Training. Potential impacts due to noise from munitions are described in subsection 5.3.3.4.

**5.3.3.9.2 Issue: *Creation of New Range Impact and Dud Areas.*** Implementation of the Alternative 1 LU & FP (CH) will result in the reallocation of various range and training areas. Upon completion of the reallocation, several existing live-fire range areas (ranges 29 and 30 Day/Night) will be relocated from the western side of FLW 1 to the eastern side of FLW 1. Additionally all new Mark 19 training with high explosives will be located at Range 19, which has an existing area designated as a dud area.

- **Direct Impact.** Relocation of live-fire ranges 29 and 30 Day/Night from western side of FLW 1 to the eastern side of FLW 1 will allow for the elimination of the established range safety fans and impacts areas associated with these ranges. This will allow for the area to safely be used for other training requirements.

  Implementation of this LU & FP will however require the construction of a new range for Mark 19 training. Training with Mark 19 high explosive rounds has a very high potential for dud rounds. Current Army policy precludes the establishment of a new dud area; consequently in order to prevent delays in training EOD personnel would need to be present at the range at all times when Mark 19 high explosive rounds would be used. If EOD personnel are not available at the range training would have to be stopped until they could arrive and dispose of each dud round as it occurs.

- **Indirect Impacts.** By requiring EOD personnel to stand-by during training, the long-term cost of training under Alternative 1 LU & FP (CH) would be higher than it would be under the Army's Proposed Action. Additionally, delays in training while waiting for EOD to dispose of each dud round as it occurs would result in adverse impacts in class training schedules.

## 5.3.3.10 Permits and Regulatory Authority

Implementation of the BRAC Action and the associated construction has created concern over the following issues with respect to Permits and Regulatory Authority.

- Land disturbance storm water permits, and
- Stream encroachment permits

**5.3.3.10.1 Issue: *Land Disturbance Storm Water Permits.*** For a discussion of this issue, see subsection 5.3.2.10.1.

- **Direct Impacts.** Alternative 1 LU & FP (CH) would require manpower for acquisition of permits prior to the construction phase of the facilities. Facility construction involving conversion, renovation, and/or reconstruction with limited land disturbance would not need to comply with permit acquisition and therefore would not have an impact from the regulatory perspective. Under Alternative 1 LU & FP (CH), the facility packages with anticipated land disturbance of more than five acres are as follows:

  - 16-Building Military Operations in Urbanized Terrain Facility (Project 45892);
  - Chemical Defense Training Facility (Project 45893);
  - General Instruction Facility (Project 46090);
  - Applied Instruction Facility (Project 46091);
  - Unaccompanied Personnel Housing (Project 46092);
  - Range Modifications (Project 46094); and

- Convert Housing (Project 46640).

- **Indirect Impacts.** Under Alternative 1 LU & FP (CH) the acquisition of land disturbance storm water permits requires implementation of short term manpower requirements for activities associated with operating, monitoring, record keeping, reporting, and implementing precautions as required by the permits.

**5.3.3.10.2 Issue: *Stream Encroachment Permits.*** For a discussion of this issue, see subsection 5.3.2.10.2.

- **Direct Impacts.** Implementation of Alternative 1 LU & FP (CH) would require a review of compliance with NWP prior to the construction phase of the range road stream crossings and facilities near wetlands and stream banks. Facility construction involving conversion, renovation, reconstruction and construction in areas without impact on stream banks at the high water level would not need to comply with permit acquisition and therefore would not have an impact from the regulatory perspective. The facilities with anticipated areas of stream or wetland encroachment are as follows:

  - Chemical Defense Training Facility (Project 45893); and
  - Range Modifications (Project 46094).

- **Indirect Impacts.** Under Alternative 1 LU & FP (CH) the acquisition of compliance with the NWP and Section 404 provisions requires implementation of short term manpower requirements for activities associated with operating, monitoring, record keeping, reporting, and implementing precautions as required by the permits.

## 5.3.3.11 Biological Resources

The analysis of Biological Resources has been divided into sections for:

- Federal T & E Species (as discussed in 5.3.3.11.A);
- Other Protected Species (as discussed in 5.3.3.11.B);
- Wetlands (as discussed in 5.3.3.11.C);
- Aquatic Resources (as discussed in 5.3.3.11.D); and
- Terrestrial Resources (as discussed in 5.3.3.11.E).

## 5.3.3.11.A Federal Threatened and Endangered Species

See subsection 5.3.2.11.A for general discussion. Only sites which will result in effects to T & E Species are included in the following discussion.

### 5.3.3.11.A.1 General Officers Quarters (Project 38174)

- **Bald Eagle.** No effect.

- **Indiana Bat.** Approximately 1.4 acres (0.6 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the General Officers Quarters.

- **Gray Bat.** No effect.

### 5.3.3.11.A.2 16-Building MOUT (Project 45892)

- **Bald Eagle.** No effect.

- **Indiana Bat.** Approximately 7.5 acres (3 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the 16-Building MOUT.

- **Gray Bat.** Approximately 2.3 acres (1 hectares) of suitable habitat will be removed for construction of the 16-Building MOUT Facility.

#### 5.3.3.11.A.3 Chemical Defense Training Facility (Project 45893)

- **Bald Eagle.** No effect.

- **Indiana Bat.** Approximately 2.3 acres (1 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the CDTF.

- **Gray Bat.** No effect.

#### 5.3.3.11.A.4 General Instruction Facility (Project 46090)

- **Bald Eagle.** No effect.

- **Indiana Bat.** No effect.

- **Gray Bat.** No effect.

#### 5.3.3.11.A.5 Applied Instruction Facility (Project 46091)

- **Bald Eagle.** No effect.

- **Indiana Bat.** Approximately 0.2 acres (.08 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the BIDS & FOX Organizational Parking Facility. 1.7 acres (.7 hectares) of low suitability habitat, and 5.2 acres (2 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the Chemical OSUT and BIDS & FOX Maintenance Facilities. 4.5 acres (2 hectares) of low suitability summer Indiana bat habitat will be removed for construction of Warehouse Storage Facility.

- **Gray Bat.** Approximately 0.2 acres (.08 hectares) of suitable habitat will be removed for construction of the BIDS & FOX Organizational Parking Facility. Construction will clear 0.2 acres of forest at edge of Penn's Pond.

#### 5.3.3.11.A.6 Unaccompanied Personnel Housing (Project 46092)

- **Bald Eagle.** No effect.

- **Indiana Bat.** Approximately 4.2 acres (1.7 hectares) of low suitability summer Indiana bat habitat will be removed for construction of new UPH Enlisted facilities. An additional 2.8 acres (1.1 hectares) of moderately suitable habitat will be removed for a soil disposal area.

- **Gray Bat.** No effect.

#### 5.3.3.11.A.7 Range Modification (Project 46094)

- **Bald Eagle.** No effect.

- **Indiana Bat.** Approximately 0.1 acres (0.04 hectares) of low suitability summer Indiana bat habitat will be removed for construction of 9 mm Fire Arms Training facilities. Approximately 5.0 acres (2 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the

HMMWV Driving Facility. Thirty-one acres (12 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the Special Reaction Team Familiarization Training Facility. Approximately 6.0 acres (2 hectares) of low suitability summer Indiana bat habitat will be removed for construction of Evasive Driving, Vehicle Maintenance - Non-Cantonment, and Vehicle Parking - Non-Cantonment Training Facilities. 2.6 acres (1 hectares) of low suitability habitat, and 5.5 acres (2 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of Flame Field Expedient Deterrents Range. An additional 0.5 acres (0.2 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the NBC Training Area. For construction of the Mark 19 Familiarization and Qualification Range, 190.4 acres of low suitability summer Indiana bat habitat will be removed.

Construction of the FOX Vehicle Swim & Parking Facilities will require removal of 0.2 acres (0.08 hectares) of low suitability summer Indiana bat habitat, which is the same land use previously identified under the Applied Construction Facilities Package, BIDS & FOX Organizational. Parking Facility.

Approximately 0.4 acres (0.2 hectares) of low suitability habitat, and 1.0 acres (0.4 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the Mobile Smoke Training Area at Ballard Hollow. Approximately 0.4 acres of low suitability will be removed for construction of the Mobile Smoke Training Area at Musgrave Hollow. An additional 2.5 acres (1 hectares) of low suitability will be removed for construction of the Mobile Smoke Training Area at Wolf Hollow. Approximately 1.4 acres (0.6 hectares) of low suitability habitat will be removed for the range support addition.

- **Gray Bat.** Approximately 4.5 acres (2 hectares) of suitable habitat will be removed for construction of the mark 19 Familiarization Range. Construction will clear > 100 feet (30 meters) of riparian forest along both sides of Mush Paddle Hollow Creek for four firing lanes crossing the creek, each 246 feet wide. Thus, 197 feet (59 meters) (98 feet each side) x 984 feet (295 meters) (246 feet x 4 lanes) of potential gray bat forested habitat will be cleared. Gray bats were captured approximately 0.9 miles (1.4 kilometers) downstream of this site. Approximately 0.2 acres (.08 hectares)of suitable habitat will be removed for construction of the NBC Training Area Facility. Construction will clear 0.2 acres (0.08 hectares) of forested riparian potential gray bat habitat within 100 feet of a small pond.

  Construction of the FOX Vehicle Swim & Parking Facilities will require removal of 0.2 acres (0.08 hectares) of suitable summer gray bat habitat, which is the same land use previously identified under the Applied Construction Facility construction package (BIDS & FOX Organizational Parking Facility).

#### 5.3.3.11.A.8 Convert Housing (Project 46640)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 19.0 acres (8 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the new UPH, Officer Housing.
- **Gray Bat.** No effect.

## 5.3.3.11.B Other Protected Species

An overall discussion of the potential impacts from construction to OPS can be found in subsection 5.3.2.11.B.

In the Alternative 1 LU & FP (CH) there could be approximately 1,053 acres (421 hectares) of the FLW installation impacted by construction activities. Approximately 83 percent of that acreage is currently

covered with vegetation such as trees, brush, or grasses, and the remaining 17 percent of the project area is currently developed or improved. Typical developed lands consist of roads, parking lots, buildings, improved training ranges, or other disturbed areas.

**5.3.3.11.B.1 General Officers Quarters (Project 38174).** There will be no direct or indirect adverse impacts to OPS as a result of constructing the General Officers Quarters (Project 38174) under the Alternative 1 LU & FP (CH).

**5.3.3.11.B.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no direct or indirect adverse impacts to OPS as a result of constructing the 16-Building MOUT package under the Alternative 1 LU & FP (CH).

**5.3.3.11.B.3 Chemical Defense Training Facility (Project 45893).**

- **Indirect Impacts.** There will be short and long-term indirect adverse impacts to OPS as a result of constructing the CDTF under the Alternative 1 LU & FP (CH). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the permanent loss of over 25 acres (10 hectares) of habitat, of which approximately 80 percent is currently forested. A discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.B.

**5.3.3.11.B.4 General Instruction Facility (Project 46090)**

- **Indirect Impacts.** There will be short and long-term indirect adverse impacts to OPS associated with the construction of the General Instruction Facility (Project 46090) under the Alternative 1 LU & FP (CH). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the permanent loss of over 28 acres (11 hectares) of habitat. A discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.B.

**5.3.3.11.B.5 Applied Instruction Facility (Project 46091)**

- **Indirect Impacts.** There will be short and long-term indirect adverse impacts to OPS associated with the construction of the Applied Instruction Facility (Project 46091) under the Alternative 1 LU & FP (CH). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the degradation of over 50 acres (20 hectares) of habitat. A discussion of the specific disturbances associated with construction can be found in subsection 5.3.2.11.B.

  The amount of vegetated area or potential OPS habitat likely to be disturbed in the Alternative 1 LU & FP (CH) is approximately 50 acres, whereas the same package in the Army's Proposed LU & FP (CH&I) is only approximately 20 acres.

**5.3.3.11.B.6 Unaccompanied Personnel Housing (Project 46092)**

- **Indirect Impacts.** There will be long-term significant indirect adverse impacts and short-term indirect adverse impacts to OPS associated with the construction of the Unaccompanied Personnel Housing (Project 46092) under the Alternative 1 LU & FP (CH). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term significant adverse impacts will be primarily due to the degradation of over 115 acres (46 hectares) of potential OPS habitat. A discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.B. A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

  Under the Alternative 1 LU & FP (CH) over 130 acres (52 hectares) could be impacted which is a 67 percent increase over the Army's Proposed LU & FP (CH&I). Of the 130 acres likely to be

impacted, approximately 115 acres (46 hectares) or 84 percent of the total acreage is covered with vegetation whereas in the Army's Proposed LU & FP (CH&I) only 40 acres (16 hectares) of the total project area was vegetated.

#### 5.3.3.11.B.7 Range Modifications (Project 46094)

- **Indirect Impact.** There is a potential for indirect long-term significant adverse impacts associated with the construction of the Range Modifications (Project 46094) under the Alternative 1 LU & FP (CH). There will also be short-term adverse impacts to OPS from the construction operation. A discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.B. A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

  The Range Modifications (Project 46094) is the most likely package in the Alternative 1 LU & FP (CH) to impact OPSs due primarily to the size of the area involved. There will be approximately 757 acres (303 hectares) impacted which is over 71 percent of the total acreage in the entire land use plan. Of the 757 acres likely to be impacted, approximately 652 acres (261 hectares) is currently covered with vegetation in the form of trees, brush, and various grasses. The Alternative 1 LU & FP (CH) is likely to impact 80 acres (32 hectares) of vegetation more than the Army's Proposed LU & FP (CH&I) and most of that acreage is currently forested or early successional trees/brush.

  Important range modifications projects that may create impacts to OPS habitat include the following: Evasive Driving Course; FFE deterrents training area; M60/M240 Familiarization and Qualification; FOX Familiarization; Mark 19 Familiarization and Qualification; Ballard Hollow Mobile Smoke Training Area; Special Reaction Team Familiarization and Qualification; and Special Reaction Team Marksman/Observer. There will be over 561 acres (224 hectares) of vegetation impacted or disturbed by these projects which may lead to increased runoff, soil erosion, and other potentially adverse impacts to OPS habitat. The Mark 19 Familiarization and Qualification Range is of particular concern, because under the Alternative 1 LU & FP (CH), the range will be located near the Cannon Range in Mush Paddle Hollow which is a tributary to Roubidoux Creek. Since over 90 percent of this area is covered with timber, clearing and habitat degradation associated with construction operations could adversely impact OPS habitat, especially for forest interior NTMs. As noted in subsection 5.3.2.11.B, there are no large tracts of forest (greater than 500 acres (200 hectares)) that have not previously been disturbed by existing trails, roads and firebreaks.

**5.3.3.11.B.8 Convert Housing (Project 46640).** There will be no direct or indirect adverse impacts to OPS from the Convert Housing (Project 46640), because under the Alternative 1 LU & FP (CH), less than three acres of vegetation will be impacted.

## 5.3.3.11.C Wetlands

An overall discussion of the possible impacts to wetlands associated with construction operations can be found in subsection 5.3.2.11.C.

**5.3.3.11.C.1 General Officers Quarters (Project 38174).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the General Officers Quarters (Project 38174) under the Alternative 1 LU & FP (CH).

**5.3.3.11.C.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no direct or indirect adverse impacts to wetlands as a result of the 16-Building MOUT, because under the Alternative 1 LU & FP (CH), existing facilities will be renovated, and there will be no new construction.

**5.3.3.11.C.3 Chemical Defense Training Facility (Project 45893).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the CDTF under the Alternative 1 LU & FP (CH).

**5.3.3.11.C.4 General Instruction Facility (Project 46090).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the General Instruction Facility (Project 46090) under the Alternative 1 LU & FP (CH).

**5.3.3.11.C.5 Applied Instruction Facility (Project 46091).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the Applied Instruction Facility (Project 46091) under the Alternative 1 LU & FP (CH).

**5.3.3.11.C.6 Unaccompanied Personnel Housing (Project 46092)**

- **Indirect Impacts.** There will be short-term indirect adverse impacts to wetlands as a result of constructing the UPH, Enlisted Housing package under the Alternative 1 LU & FP (CH). The removal of vegetation and earth work for the 130-acre (52 hectares) package will increase the likelihood of soil erosion which may be carried off-site through surface water runoff. The sediment laden waters may impact downstream wetlands, especially the bottomland hardwood wetlands adjacent to Big Piney Creek. Impacts to these wetlands can be minimized by using the BMPs as outlined in subsection 5.5.1.2.

**5.3.3.11.C.7 Range Modifications (Project 46094)**

- **Direct Impacts.** There will be long-term direct adverse impacts to wetlands as a result of constructing the Range Modifications (Project 46094) under the Alternative 1 LU & FP (CH). The construction of the Mark 19 Familiarization and Qualification Range across Mush Paddle Hollow may adversely affect two bottomland hardwood wetlands, 1.1 acres (.44 hectares) and 2.7 acres (1 hectares) respectively. Construction of the range will reduce the functional values of the wetlands, and all or a portion of the bottomland hardwoods may be cleared during construction.

- **Indirect Impacts.** There will be short-term indirect adverse impacts to wetlands as a result of constructing the Range Modifications (Project 46094) under the Alternative 1 LU & FP (CH). A discussion of the possible impacts from construction activities on wetlands can be found in subsection 5.3.2.11.C.

  Important range modification projects that may cause indirect adverse impacts to wetlands include: Evasive Driving Course; Flame Field Expedient Deterrents Training Area; M60/M240 Familiarization and Qualification; FOX Familiarization; Mark 19 Familiarization and Qualification; Ballard Hollow Mobile Smoke Training Area; Special Reaction Team Familiarization and Qualification; and Special Reaction Team Marksman/Observer. The removal of vegetation and earth work will increase the likelihood of soil erosion which may be carried off-site through surface water runoff. The sediment laden waters may impact downstream wetlands, especially the bottomland hardwood wetlands adjacent to Roubidoux Creek and Big Piney Creek. Impacts to these wetlands can be minimized by using the BMPs as outlined in subsection 5.5.1.4.

  Construction of the Mobile Smoke Training Area at Ballard Hollow could impact a 7.4-acre (3 hectares) seasonally flooded bottomland hardwood wetland. Although the smoke range construction will not be within the wetland, the construction zone for the range will be within 100 meters of the wetland boundary.

**5.3.3.11.C.8 Convert Housing (Project 46640).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the Convert Housing under the Alternative 1 LU & FP (CH).

## 5.3.3.11.D Aquatic Resources

A detailed discussion of the potential impacts from construction on aquatic resources can be found in subsection 5.3.2.11.D.

**5.3.3.11.D.1 General Officers Quarters (Project 38174)**

- **Indirect Impacts.** There is a potential for minor short-term indirect adverse impacts to aquatic species as a result of constructing the General Officers Quarters under the Alternative 1 LU & FP (CH). Since there will be a very small area disturbed during the construction of this package, the potential impacts will be very minor.

**5.3.3.11.D.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no adverse impacts to aquatic species under the Alternative 1 LU & FP (CH), because the MOUT will be a renovation of existing facilities.

**5.3.3.11.D.3 Chemical Defense Training Facility (Project 45893)**

- **Indirect Impacts.** There is a potential for short-term indirect adverse impacts to aquatic species as a result of constructing the CDTF under the Alternative 1 LU & FP (CH). Adverse impacts to aquatic resources are anticipated, because the area to be disturbed will be greater than 25 acres (10 hectares) , and most of that acreage is currently forested. The use of proper BMPs will minimize potential impacts.

**5.3.3.11.D.4 General Instruction Facility (Project 46090)**

- **Indirect Impacts.** There is a potential for short-term indirect adverse impacts to aquatic species as a result of constructing the General Instruction Facility (Project 46090) under the Alternative 1 LU & FP (CH). Over 25 acres (10 hectares) of vegetation will be impacted during construct of this package, and all of the acreage will be in the Dry Creek watershed which eventually flows into the Big Piney. The use of proper BMPs will be necessary in order to minimize potential impacts.

**5.3.3.11.D.5 Applied Instruction Facility (Project 46091)**

- **Indirect Impacts.** There is a potential for short-term indirect adverse impacts to aquatic species as a result of constructing the Applied Instruction Facility project under the Alternative 1 LU & FP (CH). The amount of vegetated area likely to be disturbed in the Alternative 1 LU & FP (CH) is approximately 50 acres (20 hectares), whereas the same package in the Army's Proposed LU & FP (CH&I) is only approximately 20 acres (8 hectares) . There is also approximately 10 acres of soils with high erosion potential in the Alternative 1 LU & FP (CH) and all of the soils in the Army's' Proposed LU & FP (CH&I) have low erosion potential.

**5.3.3.11.D.6 Unaccompanied Personnel Housing (Project 46092)**

- **Indirect Impacts.** There will be short-term indirect adverse impacts to aquatic species as a result of constructing the Unaccompanied Personnel Housing under the Alternative 1 LU & FP (CH). Under this alternative over 130 acres (52 hectares) may be impacted which is a 67 percent increase over the Army's Proposed LU & FP (CH&I). Of the 130 acres likely to be impacted, approximately 115 acres (46 hectares) or 84 percent of the total acreage is covered with vegetation whereas in the Army's Proposed LU & FP (CH&I) only 40 acres (16 hectares) of the total project area was vegetated. Disturbance to or removal of the vegetation during construction will increase the potential for soil erosion and runoff which may affect aquatic species, and there is a greater potential for impacts to aquatic species under the Alternative 1 LU & FP (CH) than under the Army's Proposed LU & FP (CH&I). The use of proper BMPs will be necessary in order to minimize potential impacts.

**5.3.3.11.D.7 Range Modifications (Project 46094)**

- **Indirect Impacts.** There will be short-term indirect adverse impacts to aquatic species as a result of constructing the Range Modifications project under the Alternative 1 LU & FP (CH). Since most

of the new range construction is taking place on existing ranges or improved training areas, no significant impacts to aquatic species are anticipated.

The Range Modifications project is the most likely package in the Alternative 1 LU & FP (CH) to impact aquatic resources due primarily to the size of the area involved. There will be approximately 757 acres (303 hectares) impacted which is over 71 percent of the total acreage in the entire land use plan. Of the 757 acres likely to be impacted, approximately 652 acres (261 hectares) is currently covered with vegetation in the form of trees, brush, and various grasses. The Alternative 1 LU & FP (CH) is likely to impact 80 acres (32 hectares) of vegetation more than the Army's Proposed LU & FP (CH&I) and most of that acreage is currently forested or early successional trees/brush.

Important range modifications projects that may create impacts to aquatic resources include the following: Evasive Driving Course; FFE deterrents training area; M60/M240 Familiarization and Qualification; FOX Familiarization; Mark 19 Familiarization and Qualification; Ballard Hollow Mobile Smoke Training Area; Special Reaction Team Familiarization and Qualification; and Special Reaction Team Marksman/Observer. There will be over 561 acres (224 hectares) of vegetation impacted or disturbed by these projects which may lead to increased runoff, soil erosion, and other potentially adverse impacts to aquatic species. The Mark 19 Familiarization and Qualification Range is of particular concern, because under the Alternative 1 LU & FP (CH), the range will be located near the Cannon Range in Mush Paddle Hollow which is a tributary to Roubidoux Creek. Since 98 percent of this area is covered with timber, clearing and habitat degradation associated with construction operations could severely impact aquatic resources. Following the suggested construction BMPs will be necessary to minimize possible impacts.

The mobile smoke training area in Ballard Hollow is a concern for aquatic resources, because there will be an unimproved crossing on Roubidoux Creek. The affected portion of Roubidoux Creek that has the creek crossing is within a losing section of stream that is normally dry except in wet weather conditions. Impacts to aquatic species can be minimized by restricting or eliminating access to the creek when there is flowing water.

#### 5.3.3.11.D.8 Convert Housing (Project 46640)

- **Indirect Impacts.** There is a slight potential for minor short-term indirect adverse impacts to aquatic species as a result of constructing the Convert Housing (Project 46640) under the Alternative 1 LU & FP (CH). Since there will be a very small area disturbed during the construction of this package, the potential impacts will be very minor.

## 5.3.3.11.E Terrestrial Resources

An overall discussion of the potential impacts from construction to Terrestrial Resources can be found in subsection 5.3.2.11.E.

In the Alternative 1 LU & FP (CH) there will be approximately 1,053 acres (421 hectares) of the FLW installation impacted by construction activities which is 1.7 percent of the total installation acreage. Approximately 83 percent (880 acres (352 hectares)) of that acreage is currently covered with vegetation such as trees, brush, or grasses, and the remaining 17 percent of the project area is currently developed or improved. Typical developed lands consist of roads, parking lots, buildings, improved training ranges, or other disturbed areas.

There will be a 28 percent (190 acres (76 hectares)) increased in the amount of terrestrial habitat likely to be impacted between the Alternative 1 LU & FP (CH) and the Army's Proposed LU & FP (CH&I).

**5.3.3.11.E.1 General Officers Quarters (Project 38174).** There will be no direct or indirect adverse impacts to terrestrial resources as a result of constructing the General Officers Quarters (Project 38174) under the Alternative 1 LU & FP (CH).

**5.3.3.11.E.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no direct or indirect adverse impacts to terrestrial resources as a result of implementing the 16-Building MOUT package, because under the Alternative 1 LU & FP (CH), existing facilities will be renovated, and there will be no new construction.

**5.3.3.11.E.3 Chemical Defense Training Facility (Project 45893)**

- **Direct Impact.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the CDTF under the Alternative 1 LU & FP (CH). There will be approximately 25 acres (10 hectares) of vegetation destroyed or degraded during the construction of this package and over 80 percent of that habitat is forested. There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the CDTF because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the CDTF under the Alternative 1 LU & FP (CH). The permanent loss and continued fragmentation of habitat will be the primary long-term impact to terrestrial wildlife.

**5.3.3.11.E.4 General Instruction Facility (Project 46090)**

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the General Instruction Facility (Project 46090) under the Alternative 1 LU & FP (CH). There will be over 28 acres (11 hectares) of potential terrestrial habitat directly impacted by clearing or other construction related disturbances during the construction of this package. Nearly half of the affected acreage (13 acres (5 hectares)) is forested. There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the General Instruction Facility (Project 46090) because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the General Instruction Facility (Project 46090) under the Alternative 1 LU & FP (CH). The permanent loss of habitat will be the primary long-term impact to terrestrial wildlife.

**5.3.3.11.E.5 Applied Instruction Facility (Project 46091)**

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the Applied Instruction Facility (Project 46091) under the Alternative 1 LU & FP (CH). Approximately 50 acres (20 hectares) of terrestrial habitat, which is currently dominated by grass, brush, and trees, will be destroyed or degraded during the construction of this package. The Applied Instruction Facility (Project 46091) under the Alternative 1 LU & FP (CH) will impact approximately 30 acres (12 hectares) of terrestrial habitat more than the Army's Proposed LU & FP (CH&I). There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the Applied Instruction Facility (Project 46091) because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the Applied Instruction Facility (Project 46091) under the Alternative 1 LU & FP (CH). The permanent loss of habitat will be the primary long-term impact to terrestrial wildlife.

**5.3.3.11.E.6 Unaccompanied Personnel Housing (Project 46092)**

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the Unaccompanied Personnel Housing (Project 46092) under the Alternative 1 LU

& FP (CH). Approximately 115 acres (46 hectares) of vegetation will be directly impacted during the construction of this package and a third of that acreage (38 acres (15 hectares)) is currently covered with brush and trees. Under the Alternative 1 LU & FP (CH), the UPH, Enlisted Housing package will impact 75 acres (30 hectares) of terrestrial habitat more than the Army's Proposed LU & FP (CH&I). There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the package because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the Unaccompanied Personnel Housing project under the Alternative 1 LU & FP (CH). The permanent loss of habitat will be the primary long-term impact to terrestrial wildlife.

**5.3.3.11.E.7 Range Modifications (Project 46094)**

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the Range Modifications (Project 46094) under the Alternative 1 LU & FP (CH). This is the most likely package in the Alternative 1 LU & FP (CH) to impact terrestrial resources due primarily to the size of the area involved. There will be approximately 757 acres (303 hectares) impacted which is over 71 percent of the total acreage in the entire land use plan. Of the 757 acres likely to be impacted, approximately 652 acres (261 hectares) is currently covered with vegetation in the form of trees, brush, and various grasses. The Alternative 1 LU & FP (CH) is likely to impact 80 acres (32 hectares) of vegetation more than the Army's Proposed LU & FP (CH&I) and most of that acreage is currently forested or early successional trees/brush.

  There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the package because of noise, dust, and disturbance. A detailed discussion of the disturbances associated with construction can be found in subsection 5.3.2.11.E.

  Important range modifications projects that may create impacts to terrestrial habitat include the following: Evasive Driving Course; Flame Field Expedient Deterrents Training Area; M60/M240 Familiarization and Qualification; FOX Familiarization; Mark 19 Familiarization and Qualification; Ballard Hollow Mobile Smoke Training Area; Special Reaction Team Familiarization and Qualification; and Special Reaction Team Marksman/Observer. There will be over 561 acres (224 hectares) of vegetation impacted or disturbed by these projects which may lead to increased runoff, soil erosion, and other potentially adverse impacts to terrestrial habitat. The Mark 19 Familiarization and Qualification Range is of particular concern, because under the Alternative 1 LU & FP (CH), the range will be located near the Cannon Range in Mush Paddle Hollow which is a tributary to Roubidoux Creek. Since 98 percent of this area is covered with mature timber, clearing and habitat degradation associated with construction operations could severely impact terrestrial vegetation.

- **Indirect Impact.** There is a potential for indirect long-term adverse impacts associated with the construction of the Range Modifications (Project 46094) under the Alternative 1 LU & FP (CH). There will also be short-term indirect adverse impacts to terrestrial wildlife from the construction operation.

**5.3.3.11.E.8 Convert Housing (Project 46640).** There will be no adverse impacts to terrestrial resources as a result of constructing the Convert Housing project under the Alternative 1 LU & FP (CH).

## 5.3.3.12 Cultural Resources

The choice and implementation of Land Use and Facility Plan will not affect potential impacts on cultural resources. See the discussion in subsection 5.3.2.12.

## 5.3.3.13 Sociological Environment

The sociological impacts of facility construction are independent of individual facilities, and, thus, are considered on an aggregate basis (see subsection 5.3.2.13).

## 5.3.3.14 Economic Development

For a discussion of the process used for the evaluation of economic impacts associated with the construction program, see subsection 5.3.2.14.

- **Direct Impacts.** Direct short-term economic impacts consist of an increase in business (sales) volume, employment and income during construction of the facilities. Almost 1,000 construction jobs would be created for facility construction under the Combined Headquarters Land Use Plan Alternative. As indicated in Appendix E, direct annual economic impacts consist of increases of $52,606,000 in sales volumes; 534 jobs in the retail trade, services and industry sectors; and $7,255,000 in direct personal income. The direct economic impacts are greater under this land use plan alternative than under the Army's Proposed LU & FP (CH&I) Alternative because of the higher facility construction cost ($255 million). The RTV is not approached for any of the above economic indicators.

- **Indirect Impacts.** Indirect impacts comprise secondary sales, employment and income generated by the employment and business activity directly associated with facility construction. The direct increase in sales and employment generates secondary sales of $49,288,000 and creates an additional 485 jobs. Total income generated, including direct and indirect, exceeds $36 million. The indirect economic impacts are also greater under this land use plan alternative than under the Army's Proposed LU & FP (CH&I) Alternative because of the higher facility construction cost.

## 5.3.3.15 Quality of Life

## 5.3.3.15.A Quality of Life

The following issues related to the Quality of Life have been identified with the implementation of the Alternative 1 Combined Headquarters Land Use and Facility Plan:

- Provision of Community Support Services Facilities;
- Recreational Access;
- Fishing Quality; and
- Proximity of MOUT Training to Cantonment.

**5.3.3.15.A.1 Issue:** ***Provision of Community Support Services Facilities.*** Provision of Community Support Services facilities. No impacts are anticipated to occur to the installation's ability to provide Community Support Service facilities. Using guidelines defined in the Army Criteria Tracking System, the facilities and their respective sizes listed in Table 5.48 have been determined by EIS analysts and the FLW Master Planning Office to be sufficient to sustain Community Support Services programs and activities at the population levels projected to occur with the mission relocation.

**5.3.3.15.A.2 Issue:** ***Recreational Access.*** Implementation of this land use plan will not require the relocation of the two soccer fields and two softball fields as required by the implementation of the Army's Proposed LU & FP (CH&I); thereby eliminating the long-term positive impact the more accessible locations for these field will have on quality of life at FLW.

**5.3.3.15.A.3 Issue:** ***Fishing Quality.*** Use of Penn's Pond for FOX amphibious training could result in negative impacts on recreational fishing.

**5.3.3.15.A.4 Issue: *Proximity of MOUT Training to Cantonment.*** The use of smoke grenades could occur at the MOUT because they have application in a number of different types of training activities. For a detailed discussion of human health issues concerning smoke grenades, see subsection 5.2.2.15.B.2. With implementation of this alternative, MOUT training will be located at the southern end of the cantonment, resulting in potential impacts on nearby building occupants.

## 5.3.3.15.B Human Health and Safety

A discussion of human health issues for the alternative methods of training to be transferred from FMC to FLW is at subsection 5.2.2.15.B No health and safety impacts are anticipated as a result of implementing this alternative.

## 5.3.3.16 Installation Agreements

No impacts on installation agreements are anticipated to result from the implementation of Alternative 1 LU & FP (CH).

## 5.3.3.17 Operational Efficiency

**5.3.3.17.1 Overview.** As discussed in subsection 5.3.2.17, the analysis contained in Appendix C was initiated with the intent of identifying the land use and facility siting plan that would enable the relocated schools to best meet their training missions, while at the same time satisfying the intent of the BRAC Commission. See subsection 5.3.2.17 for a description of the operational efficiency review process for the land use and facility plan alternatives. Table C.22, in Volume III, Appendix C, which has been replicated as Table 5.49 in subsection 5.3.2.17, summarizes the results of the review for each land use plan. The Alternative 1 Land Use and Facility Plan (Combined Headquarters) received the second highest overall rating based on the review of the 12 operational efficiency criteria, the highest rating in only 1 of the 12 criteria, the middle rating for 8 of the criteria and the lowest rating in 3 of the criteria.

**5.3.3.17.2 Evaluation.** Because Alternative 1, Land Use and Facility Plan (Combined Headquarters) would provide combined headquarters but separate classroom areas, the land use plan is able to effectively support part of the concept improving operational efficiencies as a result of collocation of the three schools. However, there will also be inherent inefficiencies with the separation of the NCO academies from their respective headquarters. This land use plan would result in the following:

a) Establishment of new, separate NCO academies to support the Military Police School and the Chemical School, in the area near the existing Engineer NCO Academy at FLW. The organization of three individual academies would increase operations costs, reduce the level of interaction and communication between staff and students from the different Corps, and not capture the potential synergistic effects available under the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction).

b) The Leader Training, Combat Development, and Training Development staffs, and the applied instruction Battle Labs will all be consolidated at the combined headquarters facility for all three school.

c) Officer training that is common to all three schools will be consolidated. Student from all three Corps (Engineer, Military Police and Chemical) will be trained in shared facilities. NCO students, on the other hand, from all three Corps will be trained in separate facilities, thereby reducing the level of interaction and communication between staff and students from the different Corps, and therefore not capturing the potential synergistic effects available under the Army's Proposed Action Alternative.

d) Officer training between the three schools will be shared; however NCO training will be conducted in three separate NCO Academies. The separate NCO Academies would reduce the ability for shared training between non-commissioned officer coursers; thereby increasing operation costs associated with duplication of instruction in common core classes, and reducing the level of interaction between members of the three Corps.

e) The new Mark 19 range will require the establishment of a new range impact dud area, or require EOD personnel to be present at the Mark 19 range during all training. This will result in increased long-term operations costs.

The benefits to be gained by such consolidation would be an increase in operational efficiency, through:

- reduced administrative staff requirements at headquarters;
- reduced administrative staff effort duplication, allowing for more effective use of available staff;
- increased communications between collocated personnel performing similar functions, reducing coordination requirements and streamlining/improving the lines of communication;
- coordinated use of both general and specialized training and support facilities, thereby increasing utilization rates and reducing the need for duplicated facilities;
- increased interaction of Corps headquarters staff;
- increased flexibility in assignment of officer students only to billets that are located proximate to the training facilities they will use most frequently, thereby resulting in reduced transportation costs; and
- reduced construction costs associated with items such as parking lots and classrooms that will not be duplicated, when compared to Alternative 2.

Implementation of the Alternative 1 Land Use and Facility Plan (Combined Headquarters) will require the construction of eight construction projects. For the majority of the construction projects the location of the BRAC activities being relocated to FLW and their functional relationship to existing FLW operations will be beneficial, with the exception of the NCO academies. The NCO academies will benefit from proximity to each other, but will lack any benefits from proximity to their respective headquarters.

## 5.3.3.18 Summary

Implementation of the Alternative 1 Land Use and Facility Plan (Combined Headquarters) and the associated construction program as discussed in subsection 5.3.3.2 thorough subsection 5.3.3.17 will result in numerous beneficial and adverse impacts. Table 5.52, below identifies only the differences between the Army's Proposed LU & FP (CH&I) (see Table 5.49 in subsection 5.3.2.18) and the Alternative 1 LU & FP (CH).

**Table 5.52:**
**Summary of Attributes Associated with Implementing Construction at Alternative 1 Land Use & Facility Plan (Combined Headquarters)**

| Attribute | Positive Attributes | Negative Attributes |
|---|---|---|
| Land Use | Facility sitings are compatible with the FLW land use plan. The combined headquarters location provides a focal point for the three schools. | Requires new range siting (within existing range area) for Mark 19 range and new dud area. |
| Geology and Soils | | The potential for soil disturbance at construction sites is 1,053 acres; there is the potential for significant short term erosion at sites with highly erodible soils. A summary of significant adverse impacts and mitigation is provided on Table 5.60, located in subsection 5.5. |
| Infrastructure | Required building square footage is approximately 1.1 million, a decrease of 30 percent from current FMC requirement. Therefore, overall Army utility requirement should decrease. | Extension of utilities needed to service CDTF (length 1.5 times Proposed Land Use) and Evasive Driving Training area. Water storage tanks for fire fighting required at CDTF location. Separation of the combined headquarters from the school facilities will increase traffic within the installation cantonment area. |
| Biological Resources | | |
| a. T & E Species | | Loss of habitat will amount to: 0 acres of high quality; 23 acres of moderate quality and 272 acres of low quality of Indiana bat habitat and 7 acres for the gray bat. |
| e. Terrestrial Resource | | The potential loss of vegetative cover/habitat amounts to 880 acres. |
| Operational Efficiency | | Does not make effective use of existing facilities, thereby increasing construction cost. When compared to the CH &I LU&FP there is a loss of benefit and synergism from not having the headquarters and schools collocated. |

*Source: Harland Bartholomew & Associates, Inc.*

# SUBSECTION 5.3.4

# Analysis of Alternative 2 LU & Fac Plan (Separate HQ)

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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# 5.3.4 IMPACTS OF IMPLEMENTING ALTERNATIVE 2 LAND USE & FACILITY PLAN (Separate Headquarters)

## 5.3.4.1 Introduction

The following analysis focuses on issues associated with the implementation of Alternative 2 Land Use and Facility Plan (Separate Headquarters). Impact Matrix 6, located in Volume II, illustrates the impacts of implementing this land use plan and all related construction project packages.

The discussion in subsections 5.3.4.2 thorough 5.3.4.17 is limited to identifying the relative differences between this land use alternative and the Army's Proposed LU & FP (CH&I) as discussed in subsection 5.3.2. A summary of the benefits and impacts associated with implementation of this land use plan is contained in subsection 5.3.4.18.

A modified copy of Table 5.39 has been provided below as Table 5.53 to illustrate the outline of the analysis structure.

**Table 5.53:**
**Matrix Display of Step 2 (Subsections 5.3.2 through 5.3.4) Land Use and Facility Plan Analysis Subsection Numbers**

| Subsection or Impact Analysis Categories | Subsection Numbers - Implementation of the Army's Proposed LU & FP (CH&I) (Subsection 5.3.2) | Subsection Numbers - Implementation of Alternative 1 LU & FP (CH) (Subsection 5.3.3) | Subsection Numbers - Implementation of Alternative 2 LU & FP (SH) (Subsection 5.3.4) |
|---|---|---|---|
| Introduction | 5.3.2.1 | 5.3.3.1 | 5.3.4.1 |
| Land Use & Training Areas | 5.3.2.2 | 5.3.3.2 | 5.3.4.2 |
| Air Quality and Climate | 5.3.2.3 | 5.3.3.3 | 5.3.4.3 |
| Noise | 5.3.2.4 | 5.3.3.4 | 5.3.4.4 |
| Water Resources | 5.3.2.5 | 5.3.3.5 | 5.3.4.5 |
| Floodplains/Surface Water | 5.3.2.5.A | 5.3.3.5.A | 5.3.4.5.A |
| Hydrology/Groundwater | 5.3.2.5.B | 5.3.3.5.B | 5.3.4.5.B |
| Geology and Soils | 5.3.2.6 | 5.3.3.6 | 5.3.4.6 |
| Infrastructure | 5.3.2.7 | 5.3.3.7 | 5.3.4.7 |
| Hazardous/Toxic Materials | 5.3.2.8 | 5.3.3.8 | 5.3.4.8 |
| Munitions | 5.3.2.9 | 5.3.3.9 | 5.3.4.9 |
| Permits/Regulatory Authority | 5.3.2.10 | 5.3.3.10 | 5.3.4.10 |
| Biological Resources | 5.3.2.11 | 5.3.3.11 | 5.3.4.11 |
| Federal T & E Species | 5.3.2.11.A | 5.3.3.11.A | 5.3.4.11.A |
| Other Protected Species | 5.3.2.11.B | 5.3.3.11.B | 5.3.4.11.B |
| Wetlands | 5.3.2.11.C | 5.3.3.11.C | 5.3.4.11.C |
| Aquatic Resources | 5.3.2.11.D | 5.3.3.11.D | 5.3.4.11.D |
| Terrestrial Resources | 5.3.2.11.E | 5.3.3.11.E | 5.3.4.11.E |
| Cultural Resources | 5.3.2.12 | 5.3.3.12 | 5.3.4.12 |
| Sociological Environment | 5.3.2.13 | 5.3.3.13 | 5.3.4.13 |
| Economic Development | 5.3.2.14 | 5.3.3.14 | 5.3.4.14 |
| Quality of Life | 5.3.2.15 | 5.3.3.15 | 5.3.4.15 |
| Quality of Life | 5.3.2.15.A | 5.3.3.15.A | 5.3.4.15.A |

| Table 5.53: Matrix Display of Step 2 (Subsections 5.3.2 through 5.3.4) Land Use and Facility Plan Analysis Subsection Numbers | | | |
|---|---|---|---|
| **Subsection or Impact Analysis Categories** | **Subsection Numbers - Implementation of the Army's Proposed LU & FP (CH&I) (Subsection 5.3.2)** | **Subsection Numbers - Implementation of Alternative 1 LU & FP (CH) (Subsection 5.3.3)** | **Subsection Numbers - Implementation of Alternative 2 LU & FP (SH) (Subsection 5.3.4)** |
| Human Health and Safety | 5.3.2.15.B | 5.3.3.15.B | 5.3.4.15.B |
| Installation Agreements | 5.3.2.16 | 5.3.3.16 | 5.3.4.16 |
| Operational Efficiency | 5.3.2.17 | 5.3.3.17 | 5.3.4.17 |
| Summary | 5.3.2.18 | 5.3.3.18 | 5.3.4.18 |
| *Source: Harland Bartholomew & Associates, Inc.* | | | |

## 5.3.4.2 Land Use & Training Areas

Implementation of Alternative 2 Land Use and Facility Development Plan (Separate Headquarters) will result in the modification of existing land use for two land use zones within the cantonment, including:

- conversion of the existing industrial and troop housing areas south of South Dakota Avenue and west of Iowa Avenue into administrative and training land uses; and
- conversion of a troop housing area along the western side of the 1000-area barracks to administrative use.

An illustration of these areas is contained on Figure 3.6, Alternative 2 BRAC Land Use Plan (Separate Headquarters) which is located in Section 3 of the EIS. These areas will be used for construction of the new instructional areas, headquarters, libraries and museums for the Military Police School and Chemical School. Construction sites that will be used if this land use plan is implemented are illustrated on Figure 3.7, Alternative 2 BRAC Facility Siting Plan (Separate Headquarters) also located in Section 3 of the EIS.

**5.3.4.2.1 General Officers Quarters (Project 38174).** As discussed in subsection 5.2.2.2.1, the construction of this project northwest of Piney Hills Drive will not have any direct or indirect impacts on Land Use or Training Areas.

**5.3.4.2.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** As discussed in subsection 5.3.2.2.2, the location of this project will occur within an area that is designated for training.

- **Indirect Impact.** Construction of the MOUT will require that training activities currently conducted on this training area be relocated to other nearby areas, resulting in an indirect impact on those training activities.

**5.3.4.2.3 Chemical Defense Training Facility (Project 45893).** As discussed in subsection 5.3.2.2.3, the location of this project will occur within an area that is designated for training and will not require the modification of the existing land use.

- **Indirect Impact.** Construction of the CDTF in TA 234 will require the relocation of the training currently conducted in the area to proximate areas, resulting in an indirect adverse impact on those training activities.

**5.3.4.2.4 General Instruction Facility (Project 46090).** Implementation of the General Instruction Facility project will consist of new construction near the intersection of Artillery Circle and Iowa Avenue and near the intersection of South Dakota Avenue and West Nineteenth Street for administration; new construction near the intersection of South Iowa Avenue and West Nineteenth Street and near the intersection of Artillery Circle and Iowa Avenue for general instruction; new construction near the intersection of Twentieth Avenue and Caisson Drive for collocated Chemical and Military Police school libraries; and new construction north of Lincoln Hall for Base Operations Administration. Also included in this package is conversion of buildings in the 1000-area for a NCOA.

- **Direct Impacts.** The area selected for administrative uses and training uses south of South Dakota Avenue and west of Iowa Avenue is designated for industrial and troop housing uses in the FLW Master Plan (FLW, 1991c). Therefore, this area will require the land use reclassification of approximately 49 acres (20 hectares) to administration and approximately 151 acres (60 hectares) to training. In addition, reclassification of an approximately 15-acre troop housing area along the western side of the 1000-area barracks to administrative use will be necessary.

**5.3.4.2.5 Applied Instruction Facility (Project 46091).** Implementation of the Applied Instruction Facility project will consist of new construction of the Chemical DATF located southwest of the 800-area and west of Alabama Avenue; new construction of Chemical OSUT to be located near the intersection of Alabama Avenue and West Nineteenth Street; new construction of Military Police OSUT to be located south of the 1000-area and east of Artillery Circle; and new construction of a warehouse in the 2300-area, south of First Street, north of East Second Street and between the railroad tracks. An existing unit maintenance facility will be assigned to the 11th Chemical Company, with the remaining vehicles of that unit maintained and stored at existing Directorate of Logistics Maintenance facilities.

- **Direct Impacts.** The renovation of 1000-area barracks to house the artifacts of the U.S. Army Chemical Museum and the U.S. Army Military Police Museum will result in a long-term adverse impact on the nearby barracks facilities.

**5.3.4.2.6 Unaccompanied Enlisted Personnel Housing (Project 46092).** Implementation of this package will involve new construction of UEPH. This land use is consistent with the current, designated land use.

**5.3.4.2.7 Range Modifications (Project 46094).** As discussed in subsection 5.3.2.2.7, construction at the various range sites will not have a direct impact on Land Use since all of the proposed sites are located within areas that are currently designated for training. Additionally, as discussed in subsection 5.3.2.2.7, the facilities are located in a pattern that incorporates shared range safety zones and impact areas. This results in a more efficient use of the area that has been designated for this activity, which reduces the total amount of land required to support training.

**5.3.4.2.8 Convert Housing (Project 46640).** Implementation of this package will involve new construction near the Sturgis Heights UOPH units. In addition, existing barracks will be reallocated as follows: 600- and 700-area reallocated to Engineer OSUT; 800-area reallocated to MP OSUT; 1000-area reallocated to Chemical OSUT; south Specker Barracks reallocated to ITRO; and north Specker Barracks reallocated to junior Permanent Party. The dining facility at Specker Barracks will be reactivated. No impacts will occur since these land uses are consistent with the current land use designations.

## 5.3.4.3 Air Quality and Climate

The following issues related to air quality and climate have been identified with the implementation of the proposed action at FLW.

- Particulate Emissions From Construction Activities; and
- Air Emissions From Utilities.

**5.3.4.3.1 Issue: *Particulate Matter Emissions From Construction Activities.*** It is not anticipated that implementation of this Alternative would result in different direct or indirect impacts on air quality than as described in the Combined Headquarters and Instruction Alternative (subsection 5.3.2.3).

**5.3.4.3.2 Issue: *Air Emissions From Utilities.*** This alternative will result in an increase in air emissions compared to the Combined Headquarters and Instruction Alternative because of the increase in energy requirements. The energy requirement increase can be approximated by proportioning either the square footage or the number of personnel in the case of Unaccompanied Personnel Housing. The air emissions are directly proportional to the energy requirements.

## 5.3.4.4 Noise

Several actions related to the BRAC realignment have the potential to create noise impacts. To facilitate training, normal construction practices will be used to erect buildings and other structures. These activities will generate short-term noise impacts. Additional vehicular noise will be generated as a result of increased operational and personnel traffic on the installation. The amount and extent of vehicular traffic is dependent upon the location of housing, training and support activities which will be determined based on the land use plan selected for implementation.

**5.3.4.4.1 Issue: *Construction Noise.*** General construction activities associated with the construction projects will have a direct short-term adverse impact during construction activity. The construction noise will be transient and for the most part confined to daylight hours. Construction locations that will increase noise levels include those illustrated on Figure 3.7, Alternative 2 BRAC Facility Siting Plan (Separate Headquarters) located in subsection 3.4.2.

**5.3.4.4.2 Issue: *Traffic Near the Lincoln, Hoge and Clarke Hall Complex.*** Except for Base Operations Administration, which is located north of Lincoln Hall, the projects in this package are sited primarily in the southwest part of the installation. With multiple streets to access the new facilities, this package should result in no significant concentration of additional traffic. Therefore, no noise impacts are anticipated.

## 5.3.4.5 Water Resources

This section examines the potential effects of the construction activities on the water resources within the installation. As described in Section 3, there are three components of the proposed action. The following paragraphs identify and describe issues associated with the construction packages that may impact water resources. The discussion has been divided into two parts: surface water and floodplains (subsection 5.3.4.5.A) and hydrogeology/groundwater (subsection 5.3.4.5.B).

Environmental controls will be followed during construction and training activities in order to limit the potential of erosion at construction and training areas. A listing of Construction Environmental Controls is located in subsection 5.1.4.2, while a listing of Training Activity Environmental Controls is located in subsection 5.1.4.2.

None of the projects are located in any regulatory floodway. Training goals with projects in floodplain areas include: TG 7.3 Obscurant Employment Operations (Mobile); and TG 7.4 Obscurant Employment Operations (Field). The facilities to be constructed include parking lots and roadways. No direct or indirect adverse impacts will occur.

Hasty decontamination training sites were selected upstream from stormwater monitoring sites included within NPDES Permit No. MO-0117251. Table H.1 in Volume III, Appendix H of the EIS specifies the location, frequency and types of items that will be monitored for in stormwater.

## 5.3.4.5.A Surface Water and Floodplains

All construction projects will include the use of Construction Environmental Controls to eliminate or reduce short-term and long-term impacts and to ensure compliance with Federal, state and local regulations, including Missouri Clean Water requirements, at FLW.

- **Indirect Impacts.** See the discussion in subsection 5.3.2.5.A.

**5.3.4.5.A.1 General Officers Quarters (Project 38174).** Under this package the Alternative 2 LU & FP (SH) could disturb approximately two acres of vegetation. See subsection 5.3.2.5.A.1 for additional information as this project will be constructed on the same location for this Alternative as it would be under the Army's Proposed LU & FP (CH&I).

**5.3.4.5.A.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Construction activities associated with the Alternative 2 LU & FP (SH) could disturb nine acres of vegetation. The disturbance of a vegetated area could increase the potential for erosion and sediment runoff. Runoff would enter the Big Piney through an unnamed tributary. The construction of this package could convert a substantial portion of the 9 acres (4 hectares) to an impervious surface. As a result infiltration is decreased and storm water runoff is increased. Storm water runoff would be discharged into existing storm channels located within 0.25 miles (0.4 km) of the construction site.

**5.3.4.5.A.3 Chemical Defense Training Facility (Project 45893).** Under this construction package, approximately 26 acres (10 hectares) of land could be disturbed under the Alternative 2 LU & FP (SH). This entire area is considered to be undeveloped. As a result, impacts to surface waters could be increased when compared to the Army's Proposed LU & FP (CH&I). Runoff from the construction site would enter Roubidoux Creek through Turnbull/Musgrave Hollow. The construction of this package could convert a substantial portion of the undeveloped area to an impervious surface. Storm water runoff would be discharged into existing stream channels, located within 0.25 miles (0.4 km) of the project site.

**5.3.4.5.A.4 General Instruction Facility (Project 46090).** This construction package involves the use of existing structures and the construction of new facilities. Construction activities associated with the use of an existing structure would not disturb soils or increase the amount of impervious surfaces. Thus, no impact to surface waters would be anticipated. However, the construction of a new facility could disturb approximately 94 acres (38 hectares) of land (70 percent more than the Army's Proposed LU & FP (CH&I)). Seventy-eight percent of this area is considered to be undeveloped which increases the potential for erosion and sediment runoff. A substantial portion of the undeveloped area could be converted to an impervious surface. As a result infiltration would decrease and storm water runoff would increase. Under this package, construction activities would not take place within 0.25 miles (0.4 km) of a surface waterbody.

**5.3.4.5.A.5 Applied Instruction Facility (Project 46091).** This construction package involves the use of existing structures and the construction of new facilities. Construction activities associated with the use of an existing structure would not disturb soils or increase the amount of impervious surfaces. Thus, no impact to surface waters would be anticipated. However, the construction of new facilities could disturb 72 acres (29 hectares) of land (76 percent more than the Army's Proposed LU & FP (CH&I)). Roughly 74 percent of this area is considered to be a vegetated area which increases the potential for erosion and sediment runoff. A substantial portion of this vegetated area could be converted to an impervious surface. As a result infiltration would decrease and storm water runoff would increase. Under this package, construction activities would not take place within 0.25 miles (0.4 km) of a surface waterbody.

**5.3.4.5.A.6 Unaccompanied Personnel Housing (Project 46092).** Under the Alternative 1 LU & FP (CH), this construction package could disturb 132 acres (53 hectares) of land (70 percent more than the Army's Proposed LU & FP (CH&I)). Of this area, approximately 58 percent is considered to be undeveloped. In comparison to the Army's Proposed LU & FP (CH&I), the quantity of undeveloped land disturbed is increased. Therefore, impacts to surface waters could be increased. Runoff from the construction site would enter Dry Creek. A substantial portion of the undeveloped area could be converted to an impervious surface. Under this package, construction activities would not take place within 0.25 miles (0.4 km) of a surface waterbody. The construction package includes the construction of a storm water detention basin.

**5.3.4.5.A.7 Range Modifications (Project 46094).** Under this construction package, several ranges would undergo modifications. These modifications involve a variety of existing ranges and the construction of new training areas. Overall a total of 844 acres (338 hectares) of land could be disturbed within the Big Piney River and Roubidoux Creek drainage areas. Of these 844 acres of land, 85 percent is considered to be undeveloped. Range modifications generally involve earth movement and clearing. A substantial amount of the undeveloped land would remain as a pervious surface. Infiltration would continue and an increase in the magnitude of storm water runoff is not anticipated. Substantial projects within the package include the following:

Big Piney River Drainage Area

- M60/M240 Familiarization and Qualification, 45 acres (18 hectares) disturbed (McCourtney Hollow);
- Mark 19 Familiarization, 322 acres (129 hectares) disturbed (McCourtney Hollow);
- Special Reaction Team Familiarization and Qualification, 44 acres (18 hectares) disturbed (McCourtney Hollow); and
- Special Reaction Team Marksman/Observer, 44 acres (18 hectares) disturbed (Unnamed Tributary).

Roubidoux Creek Drainage Area

- Evasive Driving, 79 acres (32 hectares) disturbed (Smith Branch);
- Flame Field Expedient Deterrents Training Area, 92 acres (37 hectares) disturbed (McCann Hollow);
- Mark 19 Qualification, 45 acres (18 hectares) disturbed (Bailey Hollow); and
- Mobile Smoke Training, 111 acres (44 hectares) disturbed (Bailey/McCann Hollow).

Many of the project site which will be used under this land use and facility plan are located within 0.25 miles (0.4 km) of existing storm channels or surface water bodies. These sites include:

- 2-9 FOX Vehicle Amphibious field/maneuver training area;
- 2-11 NBC Survival Recovery training area (storm drainage);
- 2-12 Obscurant, Employment Operations, Basic (static);
- 2-13 Obscurant, Employment Operations, Field and Mobile;
- 2-14 Obscurant, Employment Operations, Field and Mobile;
- 2-15 Obscurant, Employment Operations, Field and Mobile;
- 2-16 Obscurant, Employment Operations, Field and Mobile;
- 2-17a Obscurant, exterior storage;
- 2-20 M60/M240 Familiarization and Qualification range (storm drainage);
- 2-21 Marine NBC training area;
- 2-22 Marine Shotgun range;
- 2-23 Mark 19 Familiarization and Qualification range (storm drainage);
- 2-24 FOX Vehicle Familiarization range (storm drainage);
- 2-25 Special Reaction Team Marksmanship/Observer range;
- 2-26 Special Reaction Team range (storm drainage);
- 2-27 Range Control, administrative addition;

- 2-28 Range Control, general instruction classroom addition;
- 2-30 Relocate Range 30 Day/Night;
- 2-33 Relocate Zero Fire (M16) range (storm drainage);
- 2-34 9 mm Pistol (Fire Arms Training Simulator);
- 2-35 Marine 9 mm Pistol;
- 2-36 Marine Combat Pistol;
- 2-37 HMMWV Driving training area; and
- 2-38 Evasive Driving training area.

The Mark 19 Familiarization involves the construction of a new range. This new range could disturb approximately 322 acres (129 hectares) of land. Of these 322 acres, 297 (119 hectares) are undeveloped and covered with vegetation such as trees, brush or grassland. Disturbance of this area may lead to increased runoff, soil erosion and other potentially adverse impacts to surface waters. To reduce the impacts to McCourtney Hollow, a detention basin should be constructed to collect runoff from the site.

The construction activities associated with the mobile smoke training areas will impact approximately 122 acres (49 hectares) of land. This package includes detention basins sized to accommodate the additional runoff from road construction and widening.

**5.3.4.5.A.8 Convert Housing (Project 46640).** This construction package involves the use of existing structures and the construction of a new facility. Construction activities associated with the use of an existing structure would not disturb soils or increase the amount of impervious surfaces. Thus, no impact to surface waters would be anticipated. However, the construction of a new facility could disturb nine acres of land, all of which is undeveloped. Runoff from the construction site would enter an unnamed tributary of the Big Piney River. A substantial portion of the undeveloped area could be converted to an impervious surface. As a result infiltration would be decreased and storm water runoff would increase.

## 5.3.4.5.B Hydrogeology/Ground Water

Implementation of the planned BRAC construction packages at FLW under the Alternative 2 LU & FP (SH) will result in similar impacts to ground water as those noted in subsection 5.3.2.5.B. Differences with respect to the Army's Proposed LU & FP (CH&I) are discussed below. The major difference between the land use alternatives is in the number of acres that could be impacted and the amount of this area with a high potential for soil erosion. As with the Army's Proposed LU & FP (CH&I), impacts to ground water are indirect and are of insignificant magnitude.

Surface water monitoring (see Volume III, Appendix H) will ensure that water runoff meets all applicable standards.

**5.3.4.5.B.1 General Officers Quarters (Project 38174).** Under the Army's Proposed LU & FP (CH&I), approximately two acres (.8 hectares) could be disturbed to construct the General Officers Quarters. See subsection 5.3.2.5.A.1 for additional information as this project will be constructed on the same location for this Alternative as it would be under the Army's Proposed LU & FP (CH&I).

**5.3.4.5.B.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Under the Alternative 2 LU & FP (SH), the location of this package will be very close to the location proposed under the Army's Proposed LU & FP (CH&I). Therefore the impact will be the same as in subsection 5.3.2.5.B.2.

**5.3.4.5.B.3 Chemical Defense Training Facility (Project 45893).** Construction of the Chemical Defense Training Facility will take place in the southern portion of the base under the Alternative 2 LU & FP (SH). This construction could impact approximately 26 acres (10 hectares) . The location selected for the facility is in an area with few identified sinkholes.

**5.3.4.5.B.4 General Instruction Facility (Project 46090).** Under the Alternative 2 LU & FP (SH), approximately 94 acres (38 hectares) could be disturbed for new construction contained in the General Instruction Facility (Project 46090). The site of the new facilities is in the southern portion of the cantonment area. Several sinkholes have been identified in the vicinity of the facilities on Figure 4.7.

**5.3.4.5.B.5 Applied Instruction Facility (Project 46091).** This construction package in the Alternative 2 LU & FP (SH) entails the construction of three facilities in the southern portion of the cantonment area as well as renovation of existing buildings. The renovations will not disturb soils and will not impact ground water. The construction of the new facilities could disturb 72 acres (29 hectares) . The new facilities will be in the vicinity of several identified sinkholes.

**5.3.4.5.B.6 Unaccompanied Personnel Housing (Project 46092).** This construction, under the Alternative 2 LU & FP (SH), could disturb approximately 132 acres (53 hectares) in the southeast portion of the cantonment area. Several sinkholes identified on Figure 4.7 are located in the vicinity of the construction site.

**5.3.4.5.B.7 Range Modifications (Project 46094).** Under the Alternative 2 LU & FP (SH) a number of ranges would undergo modifications. This package includes modification to a number of existing ranges as well as the establishment of several new training areas. Approximately 844 acres (338 hectares) could be impacted as a part of this package. Most of the range modification are in the southern portion of the base, where sinkholes are less common. In addition, many of the areas have previously been disturbed through training activities associated with the existing mission at FLW.

**5.3.4.5.B.8 Convert Housing (Project 46640).** This construction package involves the renovation and reuse of existing structures.

## 5.3.4.6 Geology and Soils

This section examines the potential effects of the construction activities on the soil and geology at the installation under the Alternative 2 LU & FP (SH). This section will only consider the differences of this land use plan relative to the Army's Proposed LU & FP (CH&I). Soil erosion controls will be utilized to minimize the potential for soil erosion during construction, as presented in subsection 5.5.1.2.

**5.3.4.6.1 General Officers Quarters (Project 38174).** See subsection 5.3.2.5.A.1 for additional information as this project will be constructed on the same location for this Alternative as it would be under the Army's Proposed LU & FP (CH&I).

**5.3.4.6.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** Under the Alternative 2 LU & FP (SH), the MOUT will be constructed at a site very close to the site proposed under the Army's Proposed LU & FP (CH&I). The impacts will be the same as discussed in subsection 5.3.2.6.2.

**5.3.4.6.3 Chemical Defense Training Facility (Project 45893).** Under the Alternative 2 LU & FP (SH) the CDTF will be constructed on a site of approximately 26 acres (10 hectares) in the southern portion of the base. Slopes in this area are relatively steep. Therefore there is a high potential for soil erosion associated with this package under this land use plan. This construction will result in a direct significant adverse impact to soils. The impacts of this package are significantly greater under this land use alternative relative to the other land use alternatives. A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

**5.3.4.6.4 General Instruction Facility (Project 46090).** Under the Alternative 2 LU & FP (SH) three new facilities would be constructed, impacting a total of 94 acres (38 hectares) . The number of acres to be disturbed that occupy steep slopes is somewhat lower under this land use plan. The total acreage impacted is almost twice the amount under this alternative compared to the other two land use alternatives, which will be a greater impact than the small difference in acres with steep slopes. Both the

Chemical Administration and the MP Administration projects will result in direct adverse impacts to soils.

**5.3.4.6.5 Applied Instruction Facility (Project 46091).** Approximately 72 acres (29 hectares) may be disturbed as a result of the construction for this package under the Alternative 2 LU & FP (SH). This is an increase over the area to be disturbed under the Army's Proposed LU & FP (CH&I). In addition, several acres under this land use plan could be located in areas with steep slopes which will have a relatively high potential for soil erosion. The BIDS and FOX Maintenance, the Chemical OSUT and the MP OSUT will result in direct adverse impacts to soils.

**5.3.4.6.6 Unaccompanied Personnel Housing (Project 46092).** Under the Alternative 2 LU & FP (SH), approximately 132 acres (53 hectares) could be disturbed during the construction of this package. Approximately 10 acres (4 hectares) of this could be in areas with a high potential for soil erosion. The impacts of this package under the Alternative 2 LU & FP (SH) will be similar to the impacts under the Army's Proposed LU & FP (CH&I), which has a greater number of acres with high soil erosion potential, but a significantly smaller number of total acres impacted. Construction of this project will result in a direct significant adverse impact to soils. A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

**5.3.4.6.7 Range Modifications (Project 46094).** The Range Modifications (Project 46094) could impact approximately 844 acres under the Alternative 2 LU & FP (SH). Approximately 138 acres (55 hectares) could be in areas with steep slopes and a resulting high erosion potential. This compares to approximately 775 acres (310 hectares), 117 with a high soil erosion potential, under the Army's Proposed LU & FP (CH&I). Construction of this package will result in a slightly greater impact to soils under this land use alternative compared to the Army's Proposed LU & FP (CH&I). Projects that will result in a direct adverse impact to soils include:

- Base Recovery, project site 2-11, could disturb approximately 6 acres (2 hectares);
- M60/M240 Familiarization and Qualification may disturb approximately 45 acres (18 hectares);
- Mark 19 Qualification could disturb approximately 45 acres (18 hectares);
- Mobile Smoke Training Area near Babb Airfield could disturb approximately 10 acres (4 hectares);
- Special Reaction Team Familiarization and Qualification may disturb approximately 44 acres (18 hectares);
- Special Reaction Team Marksman/Observer may disturb approximately 44 acres (18 hectares);
- Static Smoke Training Area, project site 2-12, may disturb approximately 12 acres (5 hectares); and
- Relocation of Range 30 D/N could disturb approximately 22 acres (9 hectares).

The following projects will cause direct significant adverse impacts to soils:

- Construction of the Evasive Driving Course could disturb approximately 79 acres (32 hectares), 26 with a high soil erosion potential;
- Construction of the FFE deterrents training area, which could disturb approximately 92 acres (37 hectares) 16 of which will have steep slopes;
- Mark 19 Familiarization could disturb approximately 322 acres (129 hectares); and
- Mobile Smoke Training in the Bailey/McCann basin could disturb approximately 111 acres (44 hectares) approximately 77 acres of the project area has steep slopes.

A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3.

**5.3.4.6.8 Convert Housing (Project 46640).** This package consists of modification to existing facilities under each of the land use alternatives. Therefore there will be no impact to soils.

## 5.3.4.7 Infrastructure

The following issues related to the infrastructure systems at FLW have been identified with the implementation of the Alternative 2 Land Use and Facility Plan (Separate Headquarters).

- Availability and adequacy of existing utility service connections;
- Energy demand, and
- Traffic volume and concentration.

**5.3.4.7.1 Issue: *Availability and Adequacy of Existing Utility Service Connections.*** As discussed in subsection 5.2.2.7, the system capacities of FLW utilities are adequate to serve the anticipated increase in population. New facilities, in previously undisturbed areas, may require that new utility service connections be extended to the sites. Increases in the utility requirements for specific areas on the installation may exceed the capacity of utility lines that currently service those areas. Therefore the estimated utility demand from new facilities must be considered for the impact they may have on existing lines. Under the Alternative 2 LU & FP (SH) construction packages requiring extensive extension and upgrade of existing utilities include: the 16-Building MOUT Facility, the CDTF, the General Instruction Building, and the Evasive Driving Training Area (Figure 3.7).

- **Direct Impact.** The 16-Building MOUT Facility (Project 45892) is located approximately 1.2 miles (2 kilometers) west of the Normandy Training Area. Electrical service would have to be extended from the Normandy Training Area to service the MOUT facilities. A short-term adverse impact would result associated with the construction required to extend this electrical service.

  The CDTF (Project 45893) site is located approximately 8 miles (13 kilometers) south of the cantonment area. Water service would require a new groundwater well be constructed on site. To sufficient water for fire fighting, two water storage tanks would be needed on the site. To connect the facility to the installation's sewer system would require approximately 8 miles of new gravity and force main sewers to connect the sewage system to that currently serving the cantonment area. Natural gas for heating and operation of the autoclave would require upgrade of the natural gas line servicing the southern portion of the cantonment area plus approximately 8 miles of a new service line from the cantonment area. New electrical service would require upgrading approximately 7 miles (3 kilometers) of existing lines and adding approximately 1 mile (1.6 kilometers) of new service lines. These actions would create a short-term adverse impact associated with construction.

  The General Instruction Facility (Project 46090) located north of Lincoln Hall would exceed the capacity of the existing electrical Substation No. 1. The upgrade to this substation can be provided by Sho-Me Power at no cost to the government. All other utilities needed to service these facilities are adequate. Therefore, no adverse impact is anticipated for construction of the General Instruction Facility.

  Under the Alternative 2 LU & FP (SH), the Evasive Driving Training is located approximately 2.5 miles (4 kilometers) south of the cantonment area. At this location, the training area would utilize and benefit from the utility improvements made for the CDTF. Therefore, no adverse impact is anticipated for this training area.

- **Indirect Impact** A long-term indirect impact would occur as a result of constructing the CDTF. A new lift station in the vicinity of the southwest end of the airfield would be required to convey sewage from the CDTF to the cantonment area where gravity flow sewer lines carry sewage to the FLW wastewater treatment plant.

**5.3.4.7.2 Issue: *Energy Usage.*** The increase in effective population and the increase in the number facilities at FLW will result in an increase in the energy consumption by the installation. As

described in subsection 5.2.2.7, the utility systems have the capacity to handle the increased demands of the added square footage.

- **Direct Impact** FLW currently has approximately 11.7 million square feet of facilities requiring heating and cooling. Under the Alternative 2 LU & FP (SH), approximately 1.2 million square feet of new facilities will be constructed. To minimize the increase in energy demand, the new facilities and any existing facilities renovated will meet the energy standards of AR 11-27. Energy policies specific to FLW are contained in Supplement 1 to AR 11-27 (FLW, 1992a). New facilities would be required to adopt and abide by these same policies. Therefore, the increase in energy usage associated with the relocation of the Military Police School and Chemical School to FLW is not anticipated to have an adverse impact on the environment.

- **Indirect Impact** The Military Police School and Chemical School operate within facilities totalling approximately 1.6 million square feet at FMC. When relocated to the new facilities at FLW, the amount of square footage requiring electrical service, heating and cooling will be reduced by approximately 25 percent. In addition, the new facilities will be designed to current standards to conserve energy. Therefore, energy demand for the operation of the Military Police School and Chemical School will be reduced when they are relocated to FLW resulting in a long-term beneficial indirect impact.

**5.3.4.7.3 Issue: *Traffic Volume and Concentration.*** Implementation of the Alternative 2 LU & FP (SH) will result in a dispersion of activity across the cantonment area. This dispersion of activity will also distribute automobile traffic throughout the cantonment area. The location of the new headquarters at the southern end of the cantonment and the dispersed nature of the facilities will increase the amount of intra-post traffic, but the existing roadway systems should be able to accommodate this traffic. No significant adverse impacts on cantonment traffic are expected. Implementation of the proposed action will require the repair, expansion and modernization of several roads and road segments within the range and training areas.

- **Direct Impact.** Repair, expansion and modernization of several roads and road segments within the range and training areas improve the existing roadway infrastructure. These repairs, expansions and modernization will be accomplished as part of additional maintenance as a part of the Range Modifications (Project 46094) construction project.

- **Indirect Impact.** The repair, expansion and modernization of roads and road segments near the ranges ad training areas will result in improved (routine and emergency) access to these areas. All of the roads and road segments near the range and training areas are designed for restricted access and are not used by through traffic, consequently the utility of the improved access will be limited.

## 5.3.4.8 Hazardous and Toxic Materials

Implementation of the Alternative 2 LU & FP (SH) (Separate Headquarters) will result in the following issues related to hazardous and toxic materials used at FLW.

- Use of hazardous materials during construction; and
- Construction on contaminated sites.

**5.3.4.8.1 Issue: *Use of Hazardous Materials During Construction.*** As described in subsection 5.3.2.8, no adverse impact is anticipated as a result of contractors using hazardous materials during the course of construction activities.

**5.3.4.8.2 Issue: *Construction on Contaminated Sites.*** Sites for new facility construction projects were selected to avoid disturbance of any known contaminated sites requiring remediation through the Installation Restoration Program or the Installation Action Plan. In 1982 and 1987 the Army

conducted assessments to locate and identify areas on the installation with the potential for hazardous substance contamination. These assessments were also used by USEPA in preparing a Facility Assessment in 1992 and by FLW in preparing the Installation Action Plan which identifies areas requiring remediation. These surveys area used during Installation Master Planning to avoid siting facilities in areas where contamination may exist. Types of sites identified as having the potential for contamination including Firefighting Training Areas, landfills, and hazardous waste temporary storage areas. Funding for remediation is programmed through the Army's Installation Restoration Program.

None of the BRAC 95 facilities area proposed for areas identified in the surveys as having the potential for contamination requiring remediation through the Installation Restoration Program. In April 1996, the FLW, Directorate of Public Works, Environmental, Energy, and Natural Resources Division completed a Preliminary Assessment Screening (PAS) of all sites proposed for utilization under the each of three alternative land use and facility plans (FLW, 1996i) as a final clearance check. The PAS **did not identify any sites** included in the Installation Action Plan or which require remediation through the Installation Restoration Program.

The PASs indicated that, because many of the sites specified use under this land use plan have been used for other uses in the past, the proposed construction sites may be a potential that oil products, munitions, asbestos or underground storage tanks may have been located at the area within the sites specified for reuse: however; none of these properties would qualify for the Installation Action Plan or the Installation Restoration Plan. Facilities at these sites that are known to contain asbestos (or asbestos containing materials) have been clearly marked. Normal procedures during construction should eliminate the potential for contamination from these sites. Sites and the potential contaminate include:

- Military Police OSUT south of 1000 area and east of Artillery Circle (project site 2-4) (which is part of the Applied Instruction Facility (Project 46091) construction project) which is located in an area where oil products were used;
- Vehicle Maintenance, Cantonment (project site 2-56) (which is part of the Applied Instruction Facility (Project 46091) construction project) which is located in an area where oil products were used;
- Warehouse Storage in 2300 area (project site 2-58) (which is part of the Applied Instruction Facility (Project 46091) construction project) which is located in an area where oil products were used;
- Flame Field Expedient Deterrents Training Area at Range 24 (project site 2-5) (which is part of the Range Modifications (Project 46094) construction project) which is located in an area where munitions were used;
- Mobile Smoke Training at Bailey/McCann Hollow (project site 2-15) (which is part of the Range Modifications (Project 46094) construction project) which is located in an area where munitions were used;
- Mark 19 Familiarization at Range 19 (project site 2-23) (which is part of the Range Modifications (Project 46094) construction project) which is located in an area where munitions were used;
- Mark 19 Qualification at Range 28 (project site 2-24) (which is part of the Range Modifications (Project 46094) construction project) which is located in an area where munitions were used;
- Static Smoke Training at Range 30 (project site 2-12) (which is part of the Range Modifications (Project 46094) construction project) which is located in an area where munitions were used;
- Chemical Museum in converted 1000-area barracks (project site 2-6) which is located in an area where facilities contained asbestos or asbestos containing materials;
- Chemical School NCO Instruction at renovated 1000-area barracks (project site 2-7) which is located in an area where facilities contained asbestos or asbestos containing materials;
- Enlisted UPH south of Specker Barracks (project site 2-11) which is located in an area where facilities contained asbestos or asbestos containing materials;
- MP Museum in converted 1000-area barracks (project site 2-18) which is located in an area where facilities contained asbestos or asbestos containing materials; and
- MP School NCO Instruction at renovated 1000-area barracks (project site 2-19) which is located in an area where facilities contained asbestos or asbestos containing materials.

The construction contractor would be made aware of the prior use of these sites. Precautions would be required by the contractor to prevent contamination if disturbance of these areas is necessary. FLW currently has well defined ongoing programs to monitor and remove USTs and asbestos containing material. The proposed construction projects will expedite removal of USTs and asbestos containing material. Therefore, a short-term beneficial impact would result from the earlier removal of the USTs and asbestos containing material.

## 5.3.4.9 Munitions

The following issues related to the Munitions at FLW have been identified with the implementation of the Alternative 2 LU & FP (SH).

- Quantity of munitions used; and
- Creation of new range impact and dud areas.

**5.3.4.9.1 Issue: *Quantity of munitions used.*** Implementation of the Alternative 2 LU & FP (SH) is not anticipated to have an impact associated with munitions used at or brought to FLW. Munitions will be discharged on ranges designated for their use. As described in subsection 5.3.4.2, the Range Modification project sites will be located within areas designated for such Training. Potential impacts due to noise from munitions are described in subsection 5.3.4.4.

**5.3.4.9.2 Issue: *Creation of New Range Impact and Dud Areas.*** Implementation of the Alternative 2 LU & FP (SH) will result in the reallocation of various range and training areas. This LU & FP will result in the reallocation of several existing live-fire range areas. However the extent of range relocations when compared to the Army's Proposed LU & FP (CH&I) will be reduced as only Range 30 Day/Night will be relocated from the western side of FLW 1 to the eastern side of FLW 1. However, as in the Army's Proposed LU & FP (CH&I) all new Mark 19 training with high explosives will be located at Range 19, which has an existing area designated as a dud area.

- **Direct Impact.** Relocation of only Range 30 Day/Night from the western side of FLW 1 to the eastern side of FLW will reduce the amount and cost of initial construction required to implement proposed BRAC actions. However, relocation of only this one range will not allow for the elimination of the established range safety fans and impacts areas associated with ranges 29 and 30F.

  Collocation of the Mark 19 training with high explosives to Range 19 will allow for the use of the existing designated dud area at Range 19 for training with high-explosive rounds, eliminating a need to have EOD personnel standing by at the range during training.

- **Indirect Impacts.** By not requiring EOD personnel to stand-by during training, the long-term costs associated with Mark 19 training will be reduced when compared to Alternative 1 LU & FP (Combined Headquarters) as discussed in subsection 5.3.3.9.2.

## 5.3.4.10 Permits and Regulatory Authority

Implementation of the BRAC Action and the associated construction has created concern over the following issues with respect to Permits and Regulatory Authority.

- Land disturbance storm water permits; and
- Stream encroachment permits.

**5.3.4.10.1 Issue: *Land Disturbance Storm Water Permits.*** For a discussion of this issue, see subsection 5.3.2.10.1.

- **Direct Impacts.** Alternative 2 LU & FP (SH) would require manpower for acquisition of and compliance with these permits prior to the construction phase of the facilities. This direct adverse impact would be short term since the permits are terminated when all areas covered by the permit have been stabilized and construction is complete. Facility construction involving conversion, renovation, and/or reconstruction with limited land disturbance would not need to comply with permit acquisition and therefore would not have an impact from the regulatory perspective. Under Alternative 2 LU & FP (SH), the facility packages with anticipated land disturbance of more than five acres are as follows:

    - 16-Building Military Operations in Urbanized Terrain Facility (Project 45892);
    - Chemical Defense Training Facility (Project 45893);
    - General Instruction Facility (Project 46090);
    - Applied Instruction Facility (Project 46091);
    - Unaccompanied Personnel Housing (Project 46092);
    - Range Modifications (Project 46094); and
    - Convert Housing (Project 46640).

- **Indirect Impacts.** Under Alternative 2 LU & FP (SH) the acquisition of land disturbance storm water permits requires implementation of short term manpower requirements for activities associated with operating, monitoring, record keeping, reporting and implementing precautions as required by the permits. These are indirect adverse impacts from a commitment or resources perspective but have a benefit of protecting human health and the environment.

**5.3.4.10.2 Issue: *Stream Encroachment Permits.*** For a discussion of this issue, see subsection 5.3.2.10.2.

- **Direct Impacts.** Implementation of Alternative 2 LU & FP (SH) would require a review of compliance with NWP prior to the construction phase of the range road stream crossings and facilities near wetlands and stream banks. This direct impact would be short term since application of the NWP is associated with construction and stabilization of the impacted area. Facility construction involving conversion, renovation, reconstruction and construction in areas without impact on stream banks at the high water level would not need to comply with permit acquisition and therefore would not have an impact from the regulatory perspective. The facilities with anticipated areas of stream or wetland encroachment are as follows:

    - Chemical Defense Training Facility (Project 45893); and
    - Range Modifications (Project 46094).

- **Indirect Impacts.** Under Alternative 2 LU & FP (SH) the acquisition of compliance with the NWP and section 404 provisions requires implementation of short term activities associated with operating, monitoring, record keeping, reporting, and implementing precautions as required by the permits. These are indirect adverse impacts from a commitment or resources perspective but have a benefit of protecting human health and the environment.

## 5.3.4.11 Biological Resources

The analysis of Biological Resources has been divided into sections for:

- Federal Threatened and Endangered Species (as discussed in 5.3.4.11.A);
- Other Protected Species (as discussed in 5.3.4.11.B);
- Wetlands (as discussed in 5.3.4.11.C);
- Aquatic Resources (as discussed in 5.3.4.11.D); and
- Terrestrial Resources (as discussed in 5.3.4.11.E).

## 5.3.4.11.A Federal Threatened and Endangered Species

See subsection 5.3.2.11.A for general discussion. Only sites which will result in effects to T & E Species are included in the following discussion.

### 5.3.4.11.A.1 General Officers Quarters (Project 38174)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 1.4 acres (0.6 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the General Officers Quarters.
- **Gray Bat.** No effect.

### 5.3.4.11.A.2 16-Building MOUT (Project 45892)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 3.2 acres (1.3 hectares) of low suitability habitat, and 0.8 acres (0.3 hectares) of moderately suitable summer Indiana bat habitat will be removed for construction of the 16-Building MOUT.
- **Gray Bat.** No effect.

### 5.3.4.11.A.3 Chemical Defense Training Facility (Project 45893)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 21.0 acres (8 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the Chemical Defense Training Facility.
- **Gray Bat.** Approximately 3.8 acres (1.5 hectares) of suitable gray bat habitat will be removed for construction of the CDTF. Construction will clear greater than 100 feet-wide (30 meters) section of forest along 1,640 feet (492 meters) along north side of Musgrave Creek. Musgrave is a perennial stream with a suitable gray bat flight corridor. Gray bats were captured approximately 1.2 miles (2 kilometers) downstream of this site (FLW, 1996e).

### 5.3.4.11.A.4 General Instruction Facility (Project 46090)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 1.3 acres (0.5 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the Chemical Administration Facility. An additional 2.8 acres (1 hectare) of low suitability summer Indiana bat habitat will be removed for construction of the Military Police Administration and Officer Instruction Facility.
- **Gray Bat.** No effect.

### 5.3.4.11.A.5 Applied Instruction Facilities (Project 46091)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 0.5 acres (0.2 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the BIDS & FOX Organizational Parking Facility. An

additional 13.5 acres (5 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the MP OSUT Facility.

- **Gray Bat.** Approximately 0.5 acres (0.2 hectares) of suitable habitat will be removed for construction of the BIDS & FOX Organizational Parking Facility. Construction will clear 0.5 acres of forest edge at Bloodland Lake.

#### 5.3.4.11.A.6 Unaccompanied Personnel Housing (Project 46092)

- **Bald Eagle.** No effect.

- **Indiana Bat.** Approximately 1.4 acres (0.6 hectares) of low suitability summer Indiana bat habitat will be removed for construction of new UPH Enlisted facilities. An additional 2.8 acres (1.1 hectares) of moderately suitable habitat will be removed for a soil disposal area.

- **Gray Bat.** No effect.

#### 5.3.4.11.A.7 Range Modification (Project 46094)

- **Bald Eagle.** No effect.

- **Indiana Bat.** Approximately 5.0 acres (2 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the HMMWV Driving Facility. An additional 31.0 acres of low suitability summer Indiana bat habitat will be removed for construction of the Special Reaction Team Familiarization Training Facility. Approximately 0.2 acres (.08 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the M60 Familiarization & Qualification Range. An additional 6.0 acres (2 hectares) of low suitability summer Indiana bat habitat will be removed for construction of Evasive Driving, Vehicle Maintenance - Non-Cantonment, and Vehicle Parking - Non-Cantonment Training Facilities. Approximately 23.0 acres (9 hectares) of low suitability summer Indiana bat habitat will be removed for construction of Flame Range. An additional 1.2 acres (0.5 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the NBC Training Area.

  Construction of the FOX Vehicle Swim & Parking Facilities will require removal of 0.5 acres (0.2 hectares) of low suitability summer Indiana bat habitat, which is the same land use previously identified under the Applied Construction Facilities Package, BIDS & FOX Organizational Vehicle Parking.

  Approximately 100.0 acres (40.5 hectares) of moderately suitable habitat and 15.0 acres (6.1 hectares) of low suitability habitat will be removed for construction of the Mark 19 Familiarization and Qualification Range.

  An additional 4.0 acres (2 hectares) of low suitability habitat, and 2.3 acres (1 hectare) of moderately suitable summer Indiana bat habitat will be removed for construction of the Mobile Smoke Training Range at Bailey/McCann Hollow. Approximately 0.4 acres (0.2 hectares) of low suitability will be removed for construction of the Mobile Smoke Training Range at Musgrave Hollow. Approximately 2.5 acres (1 hectare) of low suitability habitat will be removed for construction of the Mobile Smoke Training Range at Wolf Hollow. Approximately 1.4 acres (0.6 hectares) of low suitability habitat will be removed for the Range Support addition.

- **Gray Bat.** Approximately 0.4 acres (0.2 hectares) of suitable habitat will be removed for construction of Bailey-McCann Mobile Smoke Training Facility. Construction will clear 2.0 acres (0.8 hectares) riparian forest within 100 feet (30 meters) along both sides of the intermittent Bailey Hollow Creek. Gray bats were captured approximately 0.9 mile (1.5 kilometer) downstream of this site.

Construction of the FOX Vehicle Swim & Parking Facilities will require removal of 0.5 acres (0.2 hectares) of suitable summer gray bat habitat, which is the same land use previously identified under the Applied Construction Facilities Package, BIDS & FOX Organizational. Parking Facility.

#### 5.3.4.11.A.8 Convert Housing (Project 46640)

- **Bald Eagle.** No effect.
- **Indiana Bat.** Approximately 5.0 acres (2 hectares) of low suitability summer Indiana bat habitat will be removed for construction of the new UPH Officer Housing.
- **Gray Bat.** No effect.

## 5.3.4.11.B Other Protected Species

An overall discussion of the potential impacts from construction to OPS can be found in subsection 5.3.2.11.B.

In the Alternative 2 LU & FP (SH) there could be approximately 1,187 acres (475 hectares) of the FLW installation impacted by construction activities. Approximately 82 percent of that acreage is currently covered with vegetation such as trees, brush, or grasses, and the remaining 18 percent of the project area is currently developed or improved. Typical developed lands consist of roads, parking lots, buildings, improved training ranges, or other disturbed areas.

**5.3.4.11.B.1 General Officers Quarters (Project 38174).** See subsection 5.3.2.5.A.1 for additional information as this project will be constructed on the same location for this Alternative as it would be under the Army's Proposed LU & FP (CH&I).

**5.3.4.11.B.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no direct or indirect adverse impacts to OPS as a result of constructing the 16-Building MOUT package under the Alternative 2 LU & FP (SH).

#### 5.3.4.11.B.3 Chemical Defense Training Facility (Project 45893)

- **Indirect Impacts.** There will be short and long-term indirect adverse impacts to OPS as a result of constructing the Chemical Defense Training Facility (Project 45893) under the Alternative 2 LU & FP (SH). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the permanent loss of over 25 acres of potential OPS habitat.

#### 5.3.4.11.B.4 General Instruction Facility (Project 46090)

- **Indirect Impacts.** There will be short and long-term indirect adverse impacts to OPS associated with the construction of the General Instruction Facility project under the Alternative 2 LU & FP (SH). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the degradation of over 70 acres (28 hectares) of potential OPS habitat. The anticipated impacts to OPS will not be significantly adverse due to the fact that only approximately 15 acres (6 hectares) of forest will be impacted.

#### 5.3.4.11.B.5 Applied Instruction Facility (Project 46091)

- **Indirect Impact** There will be short and long-term indirect adverse impacts to OPS associated with the construction of the Applied Instruction Facility (Project 46091) under the Alternative 2 LU & FP (SH). The short-term adverse impacts will be from the disturbance caused during

construction activities, and the long-term adverse impacts will be primarily due to the degradation of over 50 acres (20 hectares) of potential OPS habitat.

The amount of vegetated area or potential OPS habitat likely to be disturbed in the Alternative 2 LU & FP (SH) is approximately 50 acres (20 hectares), whereas the same package in the Army's Proposed LU & FP (CH&I) is only approximately 20 acres (8 hectares).

#### 5.3.4.11.B.6 Unaccompanied Personnel Housing (Project 46092)

- **Indirect Impacts.** There will be long-term indirect adverse impacts and short-term indirect adverse impacts to OPS associated with the construction of the UPH, Enlisted package under the Alternative 2 LU & FP (SH). The short-term adverse impacts will be from the disturbance caused during construction activities, and the long-term adverse impacts will be primarily due to the degradation of over 76 acres (30 hectares) of potential OPS habitat.

  Under the Alternative 2 LU & FP (SH) over 76 acres may be impacted which is a 53 percent increase over the Army's Proposed LU & FP (CH&I). Of the 132 acres (53 hectares) likely to be impacted, approximately 76 acres or 58 percent of the total package acreage is covered with vegetation whereas in the Army's Proposed LU & FP (CH&I) only 40 acres of the total package area was vegetated.

#### 5.3.4.11.B.7 Range Modifications (Project 46094)

- **Indirect Impacts.** There is a potential for indirect long-term significant adverse impacts associated with the construction of the Range Modifications project under the Alternative 2 LU & FP (SH). A summary discussion of significant adverse impacts is provided in subsection 5.5.1.3. There will also be short-term adverse impacts to OPS from the construction operation.

  The Range Modifications project is the most likely package in the Alternative 2 LU & FP (SH) to impact OPS due primarily to the size of the area involved. There will be approximately 844 acres (338 hectares) impacted which is over 71 percent of the total acreage in the entire land use plan. Of the 844 acres likely to be impacted, approximately 721 acres (288 hectares) are currently covered with vegetation in the form of trees, brush, and various grasses. The Alternative 2 LU & FP (SH) is likely to impact 149 acres (50 hectares) of vegetation more than the Army's Proposed LU & FP (CH&I) and 69 acres (28 hectares) of vegetation more than the Alternative 1 LU & FP (CH). The Alternative 2 LU & FP (SH) will have a greater potential for adversely impacting OPS habitat than the Army's Proposed LU & FP (CH&I) or the Alternative 1 LU & FP (CH).

  Important range modifications projects that may potentially impact OPS habitat include the following: Evasive Driving Course; FFE deterrents training area; M60 Familiarization and Qualification; Mark 19 Familiarization; Mark 19 Qualification; Bailey/McCann Hollow Mobile Smoke Training Area; Special Reaction Team Familiarization and Qualification; and Special Reaction Team Marksman/Observer. There will be over 669 acres (268 hectares) of vegetation disturbed or impacted by these projects which may lead to increased runoff, soil erosion, and other potentially adverse impacts to OPS habitat.

**5.3.4.11.B.8 Convert Housing (Project 46640).** There will be no direct or indirect adverse impacts to OPS from the Convert Housing (Project 46640), because under the Alternative 2 LU & FP (SH), less than 10 acres of vegetation will be impacted.

## 5.3.4.11.C Wetlands

An overall discussion of the possible impacts to wetlands associated with construction operations can be found in subsection 5.3.2.11.C.

**5.3.4.11.C.1 General Officers Quarters (Project 38174).** See subsection 5.3.2.5.A.1 for additional information as this project will be constructed on the same location for this Alternative as it would be under the Army's Proposed LU & FP (CH&I).

**5.3.4.11.C.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the 16-Building MOUT package under the Alternative 2 LU & FP (SH).

**5.3.4.11.C.3 Chemical Defense Training Facility (Project 45893).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the CDTF under the Alternative 2 LU & FP (SH).

**5.3.4.11.C.4 General Instruction Facility (Project 46090).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the General Instruction Facility (Project 46090) under the Alternative 2 LU & FP (SH).

**5.3.4.11.C.5 Applied Instruction Facility (Project 46091).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing the Applied Instruction Facility (Project 46091) under Alternative 2 LU & FP (SH).

**5.3.4.11.C.6 Unaccompanied Personnel Housing (Project 46092)**

- **Indirect Impacts.** There will be short-term indirect adverse impacts to wetlands as a result of constructing the UEPH Housing package under the Alternative 2 LU & FP (SH). The removal of vegetation and earth work for the 132-acre (53-hectare) package will increase the likelihood of soil erosion which may be carried off-site through surface water runoff. The sediment laden waters may impact downstream wetlands, especially the bottomland hardwood wetlands adjacent to Big Piney Creek. Impacts to these wetlands can be minimized by using the BMPs as outlined in subsection 5.5.1.2.

**5.3.4.11.C.7 Range Modifications (Project 46094)**

- **Indirect Impacts.** There will be short-term indirect adverse impacts to wetlands as a result of constructing the Range Modifications (Project 46094) under the Alternative 2 LU & FP (SH).

  Important range modification projects that may cause indirect adverse impacts to wetlands include: Evasive Driving Course; Flame Field Expedient Deterrents Training Area; M60/M240 Familiarization and Qualification; Mark 19 Familiarization; Mark 19 Qualification; Bailey/McCann Hollow Mobile Smoke Training Area; Special Reaction Team Familiarization and Qualification; and Special Reaction Team Marksman/Observer. The removal of vegetation and earth work during construction will increase the likelihood of soil erosion which may be carried off-site through surface water runoff. The sediment laden waters may impact downstream wetlands, especially the bottomland hardwood wetlands adjacent to Roubidoux Creek and Big Piney Creek. Impacts to these wetlands can be minimized by using the BMPs as outlined in subsection 5.5.1.4.

**5.3.4.11.C.8 Convert Housing (Project 46640).** There will be no direct or indirect adverse impacts to wetlands as a result of constructing this project under the Alternative 2 LU & FP (SH).

## 5.3.4.11.D Aquatic Resources

An overall discussion of the potential impacts from construction to aquatic resources can be found in subsection 5.3.2.11.D.

In the Alternative 2 LU & FP (SH) there will be approximately 1,187 acres (475 hectares) of the FLW installation impacted by construction activities. Approximately 82 percent of that acreage is currently

covered with vegetation such as trees, brush, or grasses, and the remaining 18 percent of the project area is currently developed or improved. Typical developed lands consist of roads, parking lots, buildings, improved training ranges, or other disturbed areas.

**5.3.4.11.D.1 General Officers Quarters (Project 38174).** See subsection 5.3.2.5.A.1 for additional information as this project will be constructed on the same location for this Alternative as it would be under the Army's Proposed LU & FP (CH&I).

**5.3.4.11.D.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892)**

- **Indirect Impacts.** There is a potential for minor short-term indirect adverse impacts to aquatic species as a result of constructing the MOUT package under the Alternative 2 LU & FP (SH). Since there will be a small area disturbed during the construction of this package, the potential impacts will be very minor. The use of proper BMPs will minimize or eliminate potential impacts.

**5.3.4.11.D.3 Chemical Defense Training Facility (Project 45893)**

- **Indirect Impacts.** There is a potential for short-term indirect adverse impacts to aquatic species as a result of constructing the CDTF under the Alternative 1 LU & FP (CH). The CDTF will be constructed in Turnbull/Musgrave Hollow under the Alternative 2 LU & FP (SH). Adverse impacts to aquatic resources are anticipated, because the area to be disturbed will be greater than 25 acres (10 hectares), all of that acreage is currently forested, and all of the soils have a high erosion potential. Alternative 2 will have a greater potential for adversely impacting aquatic resources than the Army's Proposed LU & FP (CH&I) or the Alternative 1 LU & FP (CH).

**5.3.4.11.D.4 General Instruction Facility (Project 46090)**

- **Indirect Impacts.** There is a potential for short-term indirect adverse impacts to aquatic species as a result of constructing the General Instruction Facility (Project 46090) under the Alternative 2 LU & FP (SH). The Alternative 2 LU & FP (SH) will have a greater potential for adverse impacts to aquatic species than the Army's Proposed LU & FP (CH&I) or the Alternative 1 LU & FP (CH), because there is a 47 percent increase (39 additional acres (16 hectares)) in the area likely to be effected. Approximately 73 acres (29 hectares) of vegetation will be impacted or disturbed under the Alternative 2 LU & FP (SH), which is 45 acres (18 hectares) greater than the Army's Proposed LU & FP (CH&I) and the Alternative 1 LU & FP (CH).

**5.3.4.11.D.5 Applied Instruction Facility (Project 46091)**

- **Indirect Impacts.** There is a potential for short-term indirect adverse impacts to aquatic species as a result of constructing the Applied Instruction Facility (Project 46091) under the Alternative 2 LU & FP (SH). The amount of vegetated area to be altered or disturbed in the Alternative 2 LU & FP (SH) is approximately 50 acres (20 hectares), whereas the same package in the Army's Proposed LU & FP (CH&I) is only approximately 20 acres (8 hectares). Alternative 2 will have a greater potential for adversely impacting aquatic resources than the Army's Proposed LU & FP (CH&I).

**5.3.4.11.D.6 Unaccompanied Personnel Housing (Project 46092)**

- **Indirect Impacts.** There will be short-term indirect adverse impacts to aquatic species as a result of constructing the UPH, Enlisted package under the Alternative 2 LU & FP (SH). Under the Alternative 2 LU & FP (SH) over 130 acres (52 hectares) will be impacted which is a 67 percent increase over the Army's Proposed LU & FP (CH&I). Of the 130 acres likely to be impacted, approximately 115 acres (46 hectares) or 84 percent of the total acreage is covered with vegetation, whereas in the Army's Proposed LU & FP (CH&I) only 40 acres (16 hectares) of the total project area was vegetated. Removal or degradation of the vegetation during construction will increase the potential for soil erosion and runoff which may affect aquatic

species, and there is a greater potential for impacts to aquatic species under the Alternative 2 LU & FP (SH).

#### 5.3.4.11.D.7 Range Modifications (Project 46094)

- **Indirect Impacts.** There will be short-term indirect adverse impacts to aquatic species as a result of constructing the Range Modifications project under the Alternative 2 LU & FP (SH).

  The Range Modifications project is the most likely package in the Alternative 2 LU & FP (SH) to impact aquatic resources due primarily to the size of the area involved. There will be approximately 844 acres (338 hectares) impacted which is over 71 percent of the total acreage in the entire land use plan. Of the 844 acres (338 hectares) likely to be impacted, approximately 721 acres are currently covered with vegetation in the form of trees, brush, and various grasses. The Alternative 2 LU & FP (SH) is likely to impact 149 acres (60 hectares) of vegetation more than the Army's Proposed LU & FP (CH&I) and 69 acres (28 hectares) of vegetation more than the Alternative 1 LU & FP (CH). The Alternative 2 LU & FP (SH) will have a greater potential for adversely impacting aquatic resources than the Army's Proposed LU & FP (CH&I) or the Alternative 1 LU & FP (CH).

  Important range modifications projects that may create impacts to aquatic resources include the following: Evasive Driving Course; FFE deterrents training area; M60/M240 Familiarization and Qualification; Mark 19 Familiarization; Mark 19 Qualification; Bailey/McCann Hollow Mobile Smoke Training Area; Special Reaction Team Familiarization and Qualification; and Special Reaction Team Marksman/Observer. There will be over 669 acres (268 hectares) of vegetation disturbed or impacted by these projects which may lead to increased runoff, soil erosion, and other potentially adverse impacts to aquatic species. Following the suggested construction BMPs will be necessary to minimize possible impacts.

#### 5.3.4.11.D.8 Convert Housing (Project 46640)

- **Indirect Impacts.** There is a potential for minor short-term indirect adverse impacts to aquatic species as a result of constructing the Convert Housing project under the Alternative 2 LU & FP (SH). Since there will be a very small area disturbed during the construction of this package, the potential impacts will be very minor.

## 5.3.4.11.E Terrestrial Resources

An overall discussion of the potential impacts from construction to Terrestrial Resources can be found in subsection 5.3.2.11.E.

In the Alternative 2 LU & FP (SH) there will be approximately 1,187 acres (475 hectares) of the FLW installation impacted by construction activities which is 1.9 percent of the total installation acreage. Approximately 82 percent (968 acres (3887 hectares)) of that acreage is currently covered with vegetation such as trees, brush, or grasses, and the remaining 18 percent of the project area is currently developed or improved. Typical developed lands consist of roads, parking lots, buildings, improved training ranges, or other disturbed areas.

There will be a 40 percent (280 acres (112 hectares)) increase in the amount of terrestrial habitat likely to be impacted between the Alternative 2 LU & FP (SH) and the Army's Proposed LU & FP (CH&I). There will be a 10 percent (90 acres (36 hectares)) increased in the amount of terrestrial habitat likely to be impacted between the Alternative 2 LU & FP (SH) and the Alternative 1 LU & FP (CH).

**5.3.4.11.E.1 General Officers Quarters (Project 38174).** See subsection 5.3.2.5.A.1 for additional information as this project will be constructed on the same location for this Alternative as it would be under the Army's Proposed LU & FP (CH&I).

**5.3.4.11.E.2 16-Building Military Operations in Urbanized Terrain Facility (Project 45892).** There will be no direct or indirect adverse impacts to terrestrial resources as a result of constructing the 16-Building MOUT package under the Alternative 2 LU & FP (SH).

**5.3.4.11.E.3 Chemical Defense Training Facility (Project 45893)**

- **Direct Impact.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the CDTF under the Alternative 2 LU & FP (SH). There will be approximately 26 acres of vegetation removed or degraded during the construction of this package, and all of the habitat is forested. There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the CDTF because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the CDTF under the Alternative 2 LU & FP (SH). The permanent loss and continued fragmentation of habitat will be the primary long-term impact to terrestrial wildlife.

**5.3.4.11.E.4 General Instruction Facility (Project 46090)**

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the General Instruction Facility project under the Alternative 2 LU & FP (SH). There will be over 73 acres (29 hectares) of terrestrial habitat directly impacted by clearing or other construction related disturbances during the construction of this package. Approximately 21 percent of the affected acreage (15 acres (6 hectares)) is covered with trees and brush. There is a 45 acre (18 hectares) increase in affected acreage between the Alternative 2 LU & FP (SH) and the Army's Proposed LU & FP (CH&I) and the Alternative 1 LU & FP (CH). There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the General Instruction Facility (Project 46090) because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the General Instruction Facility project under the Alternative 2 LU & FP (SH). The permanent loss of habitat will be the primary long-term impact to terrestrial wildlife.

**5.3.4.11.E.5 Applied Instruction Facility (Project 46091)**

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the Applied Instruction Facility (Project 46091) under the Alternative 2 LU & FP (SH). Approximately 55 acres (22 hectares) of terrestrial habitat, which is currently dominated by grass, brush, and trees, will be destroyed or degraded during the construction of this package. The Applied Instruction Facility (Project 46091) under the Alternative 1 LU & FP (CH) will impact approximately 35 acres (14 hectares) of terrestrial habitat more than the Army's Proposed LU & FP (CH&I). There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the Applied Instruction Facility (Project 46091) because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the Applied Instruction Facility (Project 46091) under the Alternative 2 LU & FP (SH). The permanent loss of habitat will be the primary long-term impact to terrestrial wildlife.

#### 5.3.4.11.E.6 Unaccompanied Personnel Housing (Project 46092)

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the UPH, Enlisted package under the Alternative 2 LU & FP (SH). Approximately 76 acres (30 hectares) of vegetation will be directly impacted during the construction of this package and 54 percent of that acreage (41 acres) is currently covered with brush and trees. Under the Alternative 2 LU & FP (SH), the UPH, Enlisted Housing package will impact 36 acres (14 hectares) of terrestrial habitat more than the Army's Proposed LU & FP (CH&I) and 39 acres (16 hectares) less than the Alternative 1 LU & FP (CH). There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the package because of noise, dust, and disturbance.

- **Indirect Impacts.** There will be long-term indirect adverse impacts to terrestrial species as a result of constructing the UPH, Enlisted package under the Alternative 2 LU & FP (SH). The permanent loss of habitat will be the primary long-term impact to terrestrial wildlife.

#### 5.3.4.11.E.7 Range Modifications (Project 46094)

- **Direct Impacts.** There will be long-term direct adverse impacts to terrestrial resources as a result of constructing the Range Modifications project under the Alternative 2 LU & FP (SH). The Range Modifications project is the most likely package in the Alternative 2 LU & FP (SH) to impact terrestrial resources primarily due to the size of the area involved. There will be approximately 844 acres (338 hectares) impacted which is over 71 percent of the total acreage in the entire land use plan. Of the 844 acres likely to be impacted, approximately 721 acres (288 hectares) are currently covered with vegetation in the form of trees, brush, and various grasses. The Alternative 2 LU & FP (SH) is likely to impact 149 acres (60 hectares) of vegetation more than the Army's Proposed LU & FP (CH&I) and 69 acres (28 hectares) of vegetation more than the Alternative 1 LU & FP (CH). The Alternative 2 LU & FP (SH) will have a greater potential for adversely impacting terrestrial habitat than the Army's Proposed LU & FP (CH&I) or the Alternative 1 LU & FP (CH).

  Important range modifications projects that may directly impact terrestrial habitat include the following: Evasive Driving Course; Flame Field Expedient Deterrents Training Area; M60/M240 Familiarization and Qualification; Mark 19 Familiarization; Mark 19 Qualification; Bailey/McCann Hollow Mobile Smoke Training Area; Special Reaction Team Familiarization and Qualification; and Special Reaction Team Marksman/Observer. There will be over 669 acres (268 hectares) of vegetation disturbed or impacted by these projects which may lead to increased runoff, soil erosion, and other potentially adverse impacts to terrestrial habitat. There will be short-term direct adverse impacts to terrestrial wildlife during the construction of the package because of noise, dust, and disturbance.

- **Indirect Impact.** There is a potential for indirect long-term adverse impacts associated with the construction of the Range Modifications (Project 46094) under the Alternative 2 LU & FP (SH). There will also be short-term indirect adverse impacts to terrestrial wildlife from the construction operation.

**5.3.4.11.E.8 Convert Housing (Project 46640).** There will be no adverse impacts to terrestrial resources as a result of constructing this project under the Alternative 2 LU & FP (SH).

## 5.3.4.12 Cultural Resources

The choice and implementation of Alternative 2 LU & FP (SH) will not alter the potential impacts on cultural resources when compared to the Army's Proposed LU & FP (CH&I). See the discussion in subsection 5.3.2.12.

## 5.3.4.13 Sociological Environment

The sociological impacts of facility construction are independent of individual facilities, and, thus, are considered on an aggregate basis. See subsection 5.3.2.13 for additional information.

## 5.3.4.14 Economic Development

See subsection 5.3.2.14 for a general discussion of economic development issues.

- **Direct Impacts.** Direct short-term economic impacts consist of an increase in business (sales) volume, employment and income during construction of the facilities. Over 1,000 construction jobs would be created for facility construction under the Separate Headquarters Land Use Plan Alternative. As indicated in Appendix E, direct annual economic impacts consist of increases of $53,637,000 in sales volumes; 544 jobs in the retail trade, services and industry sectors; and $7,397,000 in direct personal income. The direct economic impacts are greatest under this land use plan alternative because of the higher facility construction cost ($260 million). The RTV is not approached for any of the above economic indicators.

- **Indirect Impacts.** Indirect impacts comprise secondary sales, employment and income generated by the employment and business activity directly associated with facility construction. The direct increase in sales and employment generates secondary sales of $50,254,000 and creates an additional 510 jobs. Total income generated, including direct and indirect, exceeds $36 million. The indirect economic impacts are also the greatest under this land use plan alternative because of the higher facility construction cost.

## 5.3.4.15 Quality of Life

## 5.3.4.15.A Quality of Life

The following issues related to the Quality of Life have been identified with the implementation of the Alternative 2 Separate Headquarters Land Use and Facility Plan:

- Provision of Community Support Services Facilities;
- Recreational Access;
- Fishing Quality; and
- Proximity of MOUT Training to Cantonment.

**5.3.4.15.A.1 Issue:** ***Provision of Community Support Services Facilities.*** Provision of Community Support Services facilities. No impacts are anticipated to occur to the installation's ability to provide Community Support Service facilities. Using guidelines defined in the Army Criteria Tracking System, the facilities and their respective sizes listed in Table 5.48 have been determined by EIS analysts and the FLW Master Planning Office to be sufficient to sustain Community Support Services programs and activities at the population levels projected to occur with the mission relocation.

**5.3.4.15.A.2 Issue:** ***Recreational Access.*** Implementation of this land use plan will not require the relocation of the two soccer fields and two softball fields as required by the implementation of the Army's Proposed LU & FP (CH&I); thereby eliminating the long-term positive impact the more accessible locations for these field will have on quality of life at FLW.

**5.3.4.15.A.3 Issue:** ***Fishing Quality.*** Use of Bloodland Lake for FOX amphibious training could result in negative impacts on recreational fishing.

**5.3.4.15.A.4 Issue: *Proximity of MOUT Training to Cantonment.*** The use of smoke grenades could occur at the MOUT because they have application in a number of different types of training activities. For a detailed discussion of human health issues concerning smoke grenades, see subsection 5.2.2.15.B.2. With implementation of this alternative, MOUT training will be isolated from the cantonment and other non-range and training area activities. This will negate the potential for impacts on nearby building occupants.

## 5.3.4.15.B Human Health and Safety

A discussion of human health issues for the alternative methods of training to be transferred from FMC to FLW is at subsection 5.2.2.15.B No health and safety impacts are anticipated as a result of implementing this alternative.

## 5.3.4.16 Installation Agreements

No impacts on installation agreements are anticipated to result from the implementation of the Alternative 2 LU & FP (SH), see subsection 5.3.2.16 for additional information.

## 5.3.4.17 Operational Efficiency

**5.3.4.17.1 Overview.** As discussed in subsection 5.3.2.17, the analysis contained in Appendix C was initiated with the intent of identifying the land use and facility siting plan that would enable the relocated school to best meet their training missions, while at the same time satisfying the intent of the BRAC Commission. See subsection 5.3.2.17 for a description of the operational efficiency review process for the land use and facility plan alternatives. Table C.22, in Volume III, Appendix C, which has been replicated as Table 5.49 in subsection 5.3.2.17, summarizes the results of the review for each land use plan. The Alternative 2 Land Use and Facility Plan (Separate Headquarters) received the lowest overall rating based on the review of the 12 operational efficiency criteria. It received the highest rating in only 2 of the 12 criteria, the middle rating in 2 of the criteria and the lowest rating in 8 of the criteria.

**5.3.4.17.2 Evaluation.** Because the Alternative 2, Land Use and Facility Plan (Separate Headquarters) would provide separate headquarters, the land use plan is not able to effectively support the implementation of the MANSCEN concept discussed in subsection 5.3.2.17, above. If implemented, this land use plan would result in the:

a) Establishment of new NCO academies to support the Military Police School and the Chemical School, in addition to the one existing Engineer NCO Academy at FLW. This would increase operations costs, reduce the level of interaction and communication between staff and students from the different Corps, and therefore not capture the potential synergistic effects available under the other alternative plans.

b) The Leader Training, Combat Development, and Training Development staffs, and the applied instruction Battle Labs will be duplicated in the three Separate Headquarters. This will increase initial construction requirements and the associated environmental impacts of this construction; increase long-term maintenance and operations costs; and increase long-term impacts associated with heating and cooling the additional new facilities.

c) Students from all three Corps (Engineer, Military Police and Chemical) would be trained in separate facilities, thereby reducing the level of interaction and communication between staff and students from the different Corps, and therefore not capturing the potential synergistic effects available under the other alternative plans.

d) Separate Headquarters would reduce the ability for shared training between officer and non-commissioned officer coursers, thereby increasing operation costs associated with duplication of

instruction in common core classes and reducing the level of interaction between members of the three Corps.

e) Maintain the traditional approach of equal facilities and separate headquarters for each Corps, thereby maximizing the training benefits within the respective school and maintaining a strong Corps school identity for the Chemical School and the Military Police School.

d) Will allow the reuse of an existing dud area for Mark 19 training, reducing costs associated with removing dud rounds.

Implementation of Alternative 2 Land Use and Facility Plan (Separate Headquarters) would allow for FLW to capture only a small portion of the operations efficiencies directed by the BRAC Commission and the TRADOC Commander as discussed in subsection 5.3.2.17 above. With this land use and facility plan, officer and NCO students would have their headquarters in one area, instruction facilities in another and their housing in yet another, and the three individual schools would need to maintain full support staffs. Relative to the other two land use and facility plans, this would:

- increase the amount of parking area required for students and staff at the various classroom and training facilities, thereby increasing construction requirements and costs;
- increase the cost of providing transportation to NCO students who do not bring their privately owned vehicles as they would have to be provided transportation;
- increase the number of administrative staff that would be required to complete routine functions;
- increase difficulties involved in inter-Corps communication and fail to streamline communications;
- segregate the Corps, thereby reducing the potential for interaction of both Corps staff and students and failing to provide a community that would foster a more cooperative relationship;
- decrease the flexibility in the assignment of students to billets and result in the elimination of potential plans that would have located student billets proximate to their training facilities; and
- increase the number of general and applied instruction classrooms that would be required by forcing the duplication of common facilities, thereby increasing construction requirements, costs and environmental impacts.

Consequently, although the Alternative 2 Land Use and Facility Plan (Separate Headquarters) is a viable alternative, it is not reasonable for the Army to implement a land use plan that would:

- be less effective in providing quality training to students;
- increase initial construction requirements and costs; and
- increase vehicular traffic as students and staff commute between billets, classrooms and other support facilities.

## 5.3.4.18 Summary

Implementation of the Alternative 2 Land Use and Facility Plan (Separate Headquarters) will result in numerous beneficial and adverse impacts. Table 5.54 identifies the differences between the Army's Proposed Land Use and Facility Plan (see Table 5.49 located in subsection 5.3.2.18 above) and the Alternative 2 Land Use and Facility Plan.

**Table 5.54:**
**Summary of Attributes Associated with Implementing Construction at Alternative 2 LU & FP (SH)**

| Attribute | Positive Attributes | Negative Attributes |
|---|---|---|
| Land Use | | |
| Geology and Soils | | The potential for soil disturbance at construction site is 1,187 acres; there is the potential for short term erosion at sites with highly erodible soils. A summary of adverse impacts and mitigation is located in subsection 5.5.5. |
| Infrastructure | Required building square footage is approximately 1.2 million, a decrease by 25 percent from current FMC requirement. Therefore, overall Army utility requirement should decrease. | Extension of utilities needed to service 16 building MOUT and CDTF (2 times the length in Proposed LU & FP (CH&I))and will require 2-3 sewage pumping stations. The CDTF site will require a well and water storage tanks for fire fighting at the facility. |
| Biological Resources | | |
| a. T & E Species | | Loss of habitat will amount to: 0 acres of high quality; 109 acres of moderate quality and 137 acres of low quality of Indiana bat habitat and 5 acres for the gray bat. |
| e. Terrestrial Resource | | The potential loss of vegetative cover/habitat amounts to 968 acres. |
| Operational Efficiency | | Makes least effective use of existing facilities, increasing construction costs.<br>Separate headquarters facilities; decreases interactions and causes duplication of support elements |

*Source: Harland Bartholomew & Associates, Inc.*

# SUBSECTION 5.3.5

# Step 2 Summary

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.3.5 STEP 2 - SUPPORT FACILITIES - LAND USE AND CONSTRUCTION IMPACT ANALYSIS SUMMARY AND CONCLUSION

The reader should refer to the summary charts at the end of subsections 5.3.2 through 5.3.4 to compare the impacts of each land use and facility plan, including:

- the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) in subsection 5.3.2.18;
- Alternative 1 Land Use and Facility Plan (Combined Headquarters) in subsection 5.3.3.18; and
- Alternative 2 Land Use and Facility Plan (Separate Headquarters) in subsection 5.3.4.18.

Based on the analyses documented above, it has been determined that implementation of Alternative 2 Land Use and Facility Plan (Separate Headquarters) would result in the following attributes relative to the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) and Alternative 1 Land Use and Facility Plan (Combined Headquarters):

- the lowest potential benefit from positive synergistic effects due to the segregation of major Chemical, Military Police and Engineer functions;
- the greatest amount of duplication of services, facilities and staff required by the separate organizations;
- the lowest potential to use existing, available facilities at FLW to meet BRAC requirements;
- the highest initial construction cost at approximately $260 million; and
- the lowest overall score in the Operational Efficiency analysis (as documented in Volume III, Appendix C).

Although Alternative 2 Land Use and Facility Plan (Separate Headquarters) is a feasible alternative, it is not a reasonable alternative based on increased areas required for development, the highest potential disturbance to vegetative cover and habitat and the additional utility requirements. Based on the results of analysis conducted in Steps 1 and 2, the Alternative 2 Land Use and Facility Plan (Separate Headquarters) will be dropped from further consideration or analysis in impact analysis Steps 3 and 4.

# SUBSECTION 5.4.2

# Phased Move Alternative (Only Viable Option)

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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# 5.4 STEP 3 - POPULATION REALIGNMENT IMPACT ANALYSIS

This subsection analyzes the consequences of realigning the BRAC population to FLW as described in subsection 2.4.3.

## 5.4.1 THE NO ACTION ALTERNATIVE

Subsection 3.5 describes the No Action Alternative for this element of the BRAC action, and provides the rationale for concluding that this action is not reasonable. Therefore, no further analysis is provided in this section.

## 5.4.2 IMPACTS OF THE ARMY'S PROPOSED PERSONNEL RELOCATION ALTERNATIVE

**5.4.2.1 Introduction.** As discussed in Section 3, subsections 3.5.2, 3.5.3 and 3.5.4, three different alternative methods were reviewed for implementing the relocation of personnel from FMC to FLW. The alternatives were each based on consideration of the timing of the population realignment including the potential for a "Total Early Move", and "Total Late Move" and a "Phased Move". Subsections 3.5.2 through 3.5.4 describes each of these alternatives, and the rationale for selection of the Phased Move Alternative as the only viable approach. Therefore, the Phased Move Alternative represents the **Army's Proposed Action** under all evaluation scenarios.

The Phased Move Alternative would involve the relocation of personnel (and related missions and equipment) on a phased schedule tied to the availability of facilities to support specific mission requirements. It is anticipated that: the relocations will be performed between scheduled class iterations; the two schools will move independently; and sections of each school will be able to move as the facilities required to support that section become available.

As currently planned, personnel will begin the relocation process in the late 1998, and relocation activities will extend through late 1999. The number of personnel planned to relocate each month is based on the completion of scheduled classes at FMC, and the start of the next class at FLW. This will reduce the impact on training schedules associated with the movement of personnel and students in the middle of a class.

Subsections 5.4.2.2 through 5.4.2.18 provide an analysis of impacts (adverse and beneficial) associated with the planned population realignment.

### 5.4.2.2 Land Use & Training Areas

No effects are anticipated on Land Use and Training Areas as a result of the implementation of the phased population relocations to FLW.

### 5.4.2.3 Air Quality and Climate

The following issues related to air quality and climate have been identified with the implementation of the proposed action at Fort Leonard Wood:

- Impact of air emissions from support functions; and
- Air emissions from mobile sources.

**5.4.2.3.1 Issue:** ***Impact of Air Emissions From Support Functions.*** Support functions are those operations associated with the population move and not specific to a training activity or construction activity. The activities that are addressed in this section include vehicle maintenance and the training aid fabrication.

Government owned vehicles undergo routine maintenance such as oil changes, tune-ups, brake replacement along with various other types of preventative maintenance. Maintenance of this nature typically does not result in air emissions. The installation also performs non-routine maintenance such as body work, painting, drive-train overhaul etc. Maintenance of this nature could include light solvent cleaning, either by hand or by dedicated degreasers (parts cleaners). Vehicle painting, both light touchup or the entire vehicle, is also considered non-routine maintenance. Movement of the FOX and BIDS vehicle systems, and the various vehicles associated with other aspects of training at the Military Police School and Chemical School will increase the number of vehicles at FLW.

Fort Leonard Wood currently has a training aid fabrication shop (B. 1448) that is responsible for construction of custom training aids and devices. This shop utilizes metal, plastic, wood etc. to create identical or scale training aids which otherwise are too small, expensive, or dangerous to utilize. The shop has a paint booth for the painting of these training aids.

- **Direct Impacts.** Typical air emissions from vehicle maintenance and training aid fabrication include both criteria pollutants and hazardous air pollutants. VOCs and particulate matter, the primary criteria pollutant emissions, are expected to increase. Fort Leonard Wood currently has an air permit (#0294-007) for multiple paint booths including the vehicle booth at Building 5266 and the training aid fabrication booth at Building 1448. The dedicated parts cleaners are also included in the air permit. The permit has conditions that limit the amount of paint, plastics, adhesives, and thinner that may be used in the paint booths. It also contains a limit on the total throughput for the parts washers. Paint and thinner usage will increase as a result of the BRAC actions. It is estimated that paint and thinner usage will increase by approximately 450 gallons per year at Building 1448 and by approximately 600 gallons per year at Building 5266 based on use at FMC (ETC, 1993b). Building 5266 has a dry filter to capture particulate and Building 1448 has a waterwall system to capture particulate. It is estimated that there will an increase of less than 100 pounds of PM-10 emissions as a result of the BRAC Action. The VOCs are anticipated to increase by 1.6 tons per year at Building 5266 and 1.5 tons per year at Building 1448. Based on the increase in usage, FLW may be required to pursue an air permit modification at Building 1448. Because these PM-10 emissions are so low, they were not included in the cumulative modeling. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

- **Indirect Impacts.** Because this source emits VOCs, indirect effects includes contributing to the formation of ground level ozone. Ambient air monitoring will be conducted for ozone as required by the fog oil permit. Details of the monitoring can be found in the Monitoring Plan Summary provided in Appendix K.

**5.4.2.3.2 Issue:** ***Air Emissions From Mobile Sources.*** Mobile sources (i.e. non-stationary sources) such as cars and trucks are a source of air emissions. Increasing the quantity of military and civilian personnel at the installation translates to a change in mobile sources and potentially the air emissions. There will be no change in commercial aircraft flight operations at the installation as a result of the BRAC actions, although there could be a slight increase in military flights due to the increased personnel and relocated training schools. See subsection 5.2.2.3 for additional discussion of mobile sources.

As described in subsection 4.3.1.1, a detailed emissions inventory was not performed for mobile sources at the installation. In addition, the emissions inventory for the Air Quality Control Region only contains stationary sources, not mobile sources. Mobile sources do not require any air permits, nor are there any reporting requirements to MDNR. An Inspection and Maintenance Program (I & M) has not been implemented for the region, thus no vehicle emissions tests are performed.

Table 5.55 provides the projected 1999 population along with the 1990 population data with a projection for Privately Owned Vehicles (POVs). The 1990 population data is used for comparison as opposed to the 1995 population. This allows a comparison between the higher population in 1990 (with acceptable air quality) to the expected increase as a result of BRAC. As indicated, the total number of Privately Owned Vehicles at FLW is anticipated to slightly increase. This is primarily a result of the increase in dependents both on-post and off-post.

**Table 5.55:**
**Privately Owned Vehicle Projected Changes (1990 through 1999)**

| Population Group. | 1990 Population [1] | Projected Population 1999 [2] | Population Difference (1999 minus 1990) | Projected Privately Owned Vehicle Change [3] |
|---|---|---|---|---|
| Permanent Party Military | 7,263 | 6,231 | (1,032) | (846) |
| Trainees/Students | 10,513 | 11,601 | +1,088 | +109 |
| **Subtotal Military Personnel** | 17,776 | 17,832 | +56 | (737) |
| DA Civilians Permanent Party | 2,199 | 1,983 | (216) | (177) |
| Other Civilian | 2,729 | 2,909 | +180 | +148 |
| Civilian Students | 0 | 83 | +83 | +68 |
| **Subtotal Civilian Personnel** | 4,928 | 4,975 | +47 | +39 |
| Dependents On-Post | 6,801 | 6,050 | (751) | (616) |
| Dependents Off-Post | 2,738 | 5,955 | +3,217 | +2,637 |
| **Subtotal Dependents** | 9,539 | 12,005 | +2,466 | +2,021 |
| **Total Personnel** | 32,243 | 34,812 | +2,569 | +1,323 |

Notes
1 *Master Plan for the U.S. Army Engineer Center and Fort Leonard Wood* (FLW, 1991d)
2 Directorate of Resource Management (*DRM, 1995)*
3 Estimated By Harland Bartholomew & Associates, Inc.

*Source: Harland Bartholomew & Associates, Inc.*

The vehicle occupancy at the Main Gate is calculated to be 1.22 occupants per vehicle (MTMC, 1996). This ratio has been applied to determine the POV adjustments for the permanent military and civilian personnel. Likewise, it is assumed that only approximately 10 percent of the temporary military personnel have a POV. This is because the temporary personnel are located at the installation for training purposes and are considered transient in nature.

The installation currently has 1,246 Government Owned Vehicles (GOVs). These are comprised of miscellaneous combat (track and wheel), construction, wheel tactical, and nontactical GSA vehicles. Movement of the FOX and BIDS vehicle systems, and the various vehicles associated with other aspects of training at the Military Police School and Chemical School will increase the number of vehicles at FLW above the 1990 levels (see subsection 5.2.2.3). Approximately 910 GOVs and equipment would be relocated from FMC. Of the 910 vehicles and equipment, only 692 are vehicles. The remaining are trailers, tanks, and generators etc. Volume III, Appendix B provides the details of the specific types of vehicles being transferred along with the quantities for each type.

In addition to the emissions from the government vehicles, there is an associated increase in fuels throughput at the facility for the vehicles. This will result in an increase in VOC emissions for both the standing and working losses from the storage tanks, plus an increase in VOC emissions from the fuel distribution at the gas station. Stage I and Stage II vapor recovery systems are installed at some locations. Fort Leonard Wood has two air permits (# 0294-007 and # 0895-030) for fuels, with conditions that limit the total throughput of fuel for the installation. The increase in fuel usage compared to the 1990 levels for the government vehicles is estimated to be 814,733 gallons of diesel fuel per year and 212,766 gallons of gasoline per year.

- **Direct Impacts.** The POV and GOV mix will include a wide variety of vehicles, both gasoline and diesel fuel powered. Typical air emissions from mobile sources include both criteria pollutants and hazardous air pollutants, with VOCs, CO and NOx the largest criteria pollutant emissions. The actual emissions will depend on many factors such as vehicle age, total vehicle miles traveled, average speed, cold/hot start frequency, fuel type, etc.

  Assuming the POV mix and vehicles miles traveled per vehicle remain the same, air emissions from POVs will increase. For GOVs, it is also anticipated that the increased quantity of vehicles will result in an increase in air emissions. A mobile source emissions inventory is not available (either for the installation or the Air Quality Control Region) that could be used as a reference point to compare the expected increase in GOV air emissions to the existing conditions, therefore detailed emission calculations have not been performed. They are not required to document mobile source air emissions as part of their annual air emissions inventory submitted to MDNR nor are they required for their local Air Quality Control Region.

  In addition, as an indication of the minor contribution of air emissions from the mobile sources associated with the Proposed Action, when the Missouri Department of Transportation (MoDOT) conducts an environmental review of proposed highway projects in an attainment area, it does not require a detailed air quality analysis for federally funded highway projects until the predicted Average Daily Traffic (ADT) volume exceeds 54,000 vehicles per year in the year of construction or 72,700 vehicles in the 20th year following construction. A traffic study performed by MTMCTEA predicts an increased volume of traffic on Missouri Avenue from the existing 24,000 vehicles (both POVs and GOVs) per day to 31,600 vehicles per day in the year 2000 (see subsection 5.3.2.7.3). This is well below the level when MoDOT begins to consider air quality emissions a significant impact to air quality. Even if you exceed the MoDOT criteria, typically only Carbon Monoxide (CO) emissions are modelled since vehicular exhaust PM-10 emissions are typically so low. MDNR does not require a detailed mobile source inventory for the EIS. Based on the above, the exhaust emission calculations from mobile sources have not been performed. Based on this traffic study and the MoDOT minimum requirements for a detailed air quality analysis, the increase in air emissions is not expected to have a significant adverse impact air quality.

  The approximate increase in VOC emissions from the increase in fuel storage and distribution is 0.24 tons per year assuming an above ground storage tank with Stage I and Stage II vapor recovery systems for gasoline and an above ground storage tank with no vapor recovery system for diesel. It is assumed that VOC emissions from the diesel storage tank are negligible. Fort Leonard Wood will be required to pursue an air permit modification to incorporate the increased fuel usage. The cumulative impacts of the BRAC Action are discussed in subsection 5.5.

- **Indirect Impacts.** Because this source emits NOx and hydrocarbons, indirect effects includes contributing to the formation of ground level ozone. Ambient air monitoring will be conducted for ozone as required by the fog oil permit. Details of the monitoring can be found in the Monitoring Plan Summary provided in Appendix K.

## 5.4.2.4 Noise

There are no anticipated effects on the noise environment as a result of the implementation of the phased population relocations to FLW.

## 5.4.2.5 Water Resources

There are no anticipated impacts to water resources as a result of the implementation of the planned BRAC population relocations to FLW.

## 5.4.2.6 Geology and Soils

There are no anticipated impacts to geology and soils as a result of the implementation of the planned BRAC population relocations to FLW.

## 5.4.2.7 Infrastructure

The following issues related to infrastructure have been identified associated with the implementation of the planned BRAC population relocations to FLW:

- Capacity of existing utility systems; and
- Energy usage.

**5.4.2.7.1 Issue:** ***Capacity of Existing Utility Systems.*** The increase in the base population will increase the demand on the existing utility systems. As discussed in subsections 4.7 and 5.2.2.7, and illustrated on Table 5.15, the capacities of the utility systems exceed the estimated requirements, and are therefore adequate to service the anticipated increase in population. Using the population figures from Table 2.3, the relocation of the Chemical School, Military Police School and associated activities to FLW will increase the estimated effective population at FLW from approximately 14,017 persons to approximately 23,126 persons. The estimated effective population that each of the utility systems can support, and the amount of excess capacity available for each of the utility systems is presented in Table 5.15. In 1990, FLW supported an effective population of 24,287 without creating an undue burden on the infrastructure components. Some improvements and extensions to existing distribution systems will be necessary with the relocation of the Chemical and MP schools to FLW, as described in subsection 5.3.2.7.

**5.4.2.7.2 Issue:** ***Energy Usage.*** The increase in base population at FLW will result in an increase in the energy consumption by the installation. Relocation of the Chemical and MP schools will result in an increase in the effective population at FLW from the current estimate of 15,242 to 23,518. No adverse impact is anticipated with the incremental increase in energy usage at FLW associated with the phased movement of personnel.

## 5.4.2.8 Hazardous and Toxic Materials

There are no anticipated impacts associated with hazardous and toxic materials as a result of the implementation of the planned BRAC population relocations to FLW.

## 5.4.2.9 Munitions

There are no anticipated impacts associated with munitions as a result of the implementation of the planned BRAC population relocations to FLW.

## 5.4.2.10 Permits and Regulatory Authority

The use of a phased personnel relocation program is not expected to alter the impacts as described for these regulatory issues in subsection 5.2.2.10. The same operating permits/licenses as described in subsection 5.2.2.10 will be required regardless of when personnel are relocated and the activities initiated. However, FLW will be required to pursue air permit modifications to incorporate the increased fuel usage and the increased paint and thinner usage at Building 1448.

## 5.4.2.11 Biological Resources

Project design features, including establishment of restricted-access zones around caves used by endangered bats, development and implementation of a landscape-scale forest management policy, and an Endangered Species Management Plan (FLW, 1996e; and FLW, 1997) will minimize the impact of human activity on federally endangered species at FLW. Current management practices (restricted-access zones around caves) are in place to limit adverse effects of the Army's ongoing mission; these will remain in effect after BRAC-related changes at FLW.

These management strategies define temporal and spatial restrictions on personnel movement that might otherwise affect T & E species. Because these land-use restrictions will be in place regardless of how personnel are relocated, there are no effects to T & E species associated with relocating the population as part of the BRAC action.

## 5.4.2.12 Cultural Resources

There are no anticipated impacts associated with cultural resources as a result of the implementation of the planned BRAC population relocations to FLW.

## 5.4.2.13 Sociological Environment

Implementation of the planned BRAC population relocations to Fort Leonard Wood will result in the following issues with respect to the Sociological Environment:

- Increase in population associated with the realignment;
- Capacity of schools to accommodate additional student load;
- Capacity of existing off-post infrastructure to accommodate additional population demands; and
- Environmental justice considerations for low income and minority populations.

**5.4.2.13.1 Issue:** ***Increase in Population Associated with the Realignment.*** The realignment of the Chemical and Police schools will result in the relocation of military trainees, temporary duty (TDY) students, military permanent party personnel and civilian personnel to FLW and the surrounding area. This will result in increased demands on local and regional resources and services.

- **Direct Impacts.** Direct long-term impacts will result from the movement of the above population to the FLW area. The EIFS Models project a total increase in population of 7,669 resulting from the realignment of the U.S. Army Chemical and Police schools to FLW. This population will consist of 3,378 trainees/students; 1,599 permanent party military personnel; 149 civilian employees relocating from outside the ROI; and 2,543 dependents. It is assumed that almost all of the trainees will reside on-post, while 90 percent of the permanent party military personnel will reside off-post. All civilian personnel will reside off-post. Applying the EIFS factor of 2.44 persons per household, off-post population will increase by approximately 3,900.

- **Indirect Impacts.** Indirect long-term indirect impacts will be associated with the accompanying increased demands on housing, infrastructure and public services within the ROI, especially in the St. Robert/Waynesville area. Workers associated with the construction projects may be expected to temporarily relocate to the area. Subsection 5.3.2.13 discusses the potential impacts of the new workers. Existing land use will be impacted by the construction of new residential, commercial and industrial development to support and service the additional population. In addition, the transportation system will be impacted by the provision of new streets to service the new developments, and by improvements to the local and regional transportation network.

**5.4.2.13.2 Issue:** ***Capacity of Schools to Accommodate Additional Student Load.*** The EIFS Operations Model which was executed for the mission realignment (see Volume III, Appendix E) indicates

that a total of 753 additional school age children will be associated with the permanent party military and civilian employee movement to FLW.

- **Direct Impacts.** Long-term direct impacts will accrue to the local school districts in the form of increased enrollments. Based upon the existing geographic residency distribution of civilian employees and off-post military personnel, it is estimated that 70-75 percent of the relocated personnel associated with the realignment will establish residency in Pulaski County. The majority (80 percent or more) will choose to reside in the St. Robert/Waynesville area. Thus, the Waynesville R-VI School District will be most directly impacted in the long-term by the influx of students associated with the realignment. Currently, approximately 90 percent of the school age dependents of FLW military personnel are enrolled in the district. Approximately 70 percent of the district's enrollment consists of dependents of the military and DOD civilian employees.

  Waynesville R-VI School District officials project a school enrollment increase of 750-1,000 students resulting from the realignment, while the EIFS Model predicts 753 new students. It is estimated that approximately 75 percent of the potential enrollment increase would occur in the off-post schools. This increase would raise the district's enrollment level to approximately 5,400 students (K-12), or the level attained in 1992 prior to military downsizing. However, it is the district's current capacity at various grade levels that will need to be addressed to accommodate the influx of anticipated students

  Currently, within the Waynesville R-VI District there is excess capacity at the high school level, with both the off-post and on-post middle schools (grades 6-8) being at or near capacity (580 and 490 students respectively). School district officials indicate that the greatest enrollment impact resulting from the realignment will be on the middle schools. Off-post elementary schools are also at near capacity, which has resulted in the transport of off-post students to on-post elementary schools which have an excess capacity of 150 students.

- **Indirect Impacts.** Long-term indirect impacts are associated with the ability of the school districts, especially the Waynesville R-6 District, to accommodate the increased enrollment in the existing physical facilities. Waynesville R-VI School District officials have plans for expanding the district's enrollment capacity. The district recently completed six new classroom additions to Peace Elementary School which became available for the 1995/96 school year. The addition of five classroom to the Waynesville R-VI High School is currently in progress. In addition, construction bids and specifications are to be let soon for a gymnasium/physical education addition to the high school. Other improvements in the district's short-range plan include the conversion of the district's existing administrative space to four-five middle school classrooms. The district's long range plan (10-year plan) includes construction of a new high school in the St. Robert/Waynesville area.

  Waynesville school district officials and Fort Leonard Wood personnel have had a long continuing working relationship in information sharing and cooperative planning for the district's educational goals and facility requirements. This relationship will continue in the planning and implementation of measures to appropriately address facility demands resulting from the realignment action. These demands will be satisfied through a combination of actions, including conversion of and additions to existing facilities, and possibly new facility construction.

**5.4.2.13.3 Issue:** ***Capacity of Existing Off-post Infrastructure to Accommodate Additional Population Demands.*** The resulting off-post housing and related commercial development will create additional demands on local municipalities for the provision of supportive infrastructure.

- **Direct Impacts.** The St. Robert/Waynesville area will be the area that receives the influx of the realigned population, and, thus, will experience the greatest direct long-term impacts on development and associated infrastructure demands. Other secondary development markets which will be directly impacted include Crocker, Dixon, Laquey and Richland in Pulaski County; Rolla in Phelps County; Lebanon in Laclede County; and Plato and Houston in Texas County.

Typical extension and construction of utilities will be required to service new residential and commercial development resulting from the realignment. The primary infrastructure facilities of the areas which will be most affected are generally of sufficient capacity to accommodate the additional demands anticipated from the realignment. The St. Robert sewage treatment plant is currently operating at 50 percent capacity. The plant's current 500,000 gpd capacity can be easily expanded to a 1,000,000 gpd capacity with design modifications. The city of St. Robert has four water wells with more than sufficient capacity to accommodate the additional service demands. However, the city may need a new water tower according to city officials. Waynesville's sewage treatment plant, which has a design capacity of 1,250,000 gpd, is also currently at 50 percent capacity. However, the city may have to drill a new water well to satisfy future demands.

With approximately 90 percent of the traffic entering at Sverdrup Gate on Missouri Avenue, which is an extension of a 4-lane divided highway extending from the neighboring communities of Waynesville and St. Robert, there is adequate capacity to accommodate the expected increase in traffic. Traffic congestion does not create problems until it arrives at key locations on the installation during peak hours. Even though there are reports of some off-post traffic congestion during 1990 when the FLW population was higher, the increase from BRAC is not expected to repeat the 1990 scenarios because FLW has instituted flexible work schedules that tend to reduce peak time congestion.

It is not anticipated that other municipal entities in Pulaski County (i.e. Crocker, Dixon, Richland) will be significantly impacted in respect to growth and development associated with the realignment. Dixon city officials indicate that the community has more than sufficient water and sewage treatment capacity to accommodate the anticipated new development. Other larger adjacent communities, such as Rolla and Lebanon, have more than sufficient utility capacity to accommodate any development associated with the realignment.

- **Indirect Impacts**. The new infrastructure demands will cause indirect short-term beneficial economic impacts in the form of wages paid to construction workers, and an increase in business volume as a result of purchases of construction materials and supplies for infrastructure installation. Short or long-term adverse environmental impacts could result from the over-utilization of septic tanks in those unincorporated areas not presently served by sanitary sewers.

**5.4.2.13.4 Issue:** ***Environmental Justice Considerations for Low Income and Minority Populations.*** On February 11, 1994, the President issued Executive Order 12898 (Volume III, Appendix D), Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations. The order requires that federal agencies conduct programs, policies and activities that substantially affect human health or the environment so that there are no disproportionately high and adverse human health or environmental effect on minority and low income populations. By memorandum on February 11, 1994, the President directed the U.S. Environmental Protection Agency to ensure that agencies analyze environmental effects on minority and low-income communities, including human health, social and economic effects.

The Army's proposed action is not designed to create a benefit for any group or individual. Realignment of the Military Police School and Chemical School to FLW does not create disproportionately high or adverse human health or environmental impacts on minority or low-income populations of the surrounding community. Review and evaluation of economic and social information from statistical data sources (e.g. U.S. Census) in Section 4 of the EIS, and input from local groups during the public involvement phase have not disclosed the existence of identifiable minority or low-income communities in the vicinity of FLW. The percent of minority population in the FLW ROI is significantly less than for the state of Missouri, with the percent of low income persons higher than the state average. The minority population primarily consists of military trainees/students as 75 percent of the minority population in Pulaski County resides on the installation according to the 1990 U.S. Census. The minority population in Phelps County is primarily associated with the University of Missouri at Rolla. The low income population is distributed throughout the ROI, with no real identifiable concentration in any particular community within the FLW environs.

- **Direct Impacts.** Realignment activities will not result in any short or long-term disproportionate adverse effects on any minority or low-income population group. Rather, the realignment should have positive effects in the form of creation of jobs for low-income and minorities in the construction trades industry and other sectors of the local and regional economy. There are no enclaves or distinguishable concentrations of low income and minority population groups in the vicinity of FLW.

## 5.4.2.14 Economic Development

The following issues related to Economic Development have been identified with the proposed BRAC population relocations to FLW:

- Economic impact of the realignment on the local and regional economy;
- Recipients of benefits from new jobs created;
- Dependency of area's economy on Fort Leonard Wood;
- Availability and desirability of off-post housing;
- Impact on municipal and county revenues;
- Tax adjustments due to change in demand on public services and infrastructure;
- Commitment of the U.S. Army to the economic viability of the surrounding area;
- Effect of potential contamination on land values;
- Attractiveness of area to clean industries and businesses;
- Fog oil training and the tourism and recreation industries;
- Short-term economic gains versus environmental losses; and
- Economic impacts and projections resulting from the new training program and increase in trainees and students.

**5.4.2.14.1 Issue:** ***Economic Impact of the Realignment on the Local and Regional Economy.*** Two EIFS Models (Training and Standard) were executed to project the annual recurring economic impacts of the realignment missions. The inputs and outputs for each of these two models are portrayed in Volume III, Appendix E. The economic impacts of facility construction, which represent one-time expenditures, are analyzed in subsection 5.3.2.14. The annual economic impacts of the existing operations at the installation are also included in another EIFS Model which is discussed in subsection 4.14.2.

- **Direct Impacts**. Direct long-term beneficial economic impacts will accrue to the FLW ROI as a result of the population movement associated with the realignment. The total projected economic impacts are derived by adding the outputs of the above two models. The overall annual economic impact of the realignment on the local and regional economy is equal to approximately 40 percent of the economic impacts of the existing annual operations at FLW. These new impacts reflect the increase in the annual spending power and employment generated spinoffs from the additional population associated with the realignment.

  The EIFS Models project an increase of $88,796,000 in direct annual business volume (sales); an increase of $12,933,000 in direct annual income; and an increase in direct employment of 914 jobs as a result of the realignment. These impacts reflect direct changes in the retail, wholesale, service and industry sectors which are initially affected by the action. As indicated in the EIFS analysis (Volume III, Appendix E), none of the economic impacts of the movement of the permanent party military and associated civilian personnel approach the regional RTVs for any of the economic indicators. However, the regional RTVs for impacts on regional employment and population are exceeded when the additional impacts of the trainees are considered.

- **Indirect Impacts**. In addition to the above direct long-term impacts are long-term induced, or indirect, impacts on business volume, income and employment. The new business, income and employment directly generated by the realignment in turn causes indirect impacts through the multiplier effect of creation of additional business, income and employment . For example, as indicated in the model outputs (Volume III, Appendix E) additional induced sales volume of

$83,195,000 will be generated by the initial direct sales resulting from the realignment. In addition, another 857 jobs will be indirectly created and $12,000,000 in income will be indirectly generated. Total direct and indirect income generated, including salaries and wages of the military and civilian population directly associated with the realignment in addition to salaries and wages of the retail and service sector employees, is projected to exceed $177 million annually.

**5.4.2.14.2 Issue:** ***Recipients of Benefits from New Jobs Created.*** New employment will be created in both the public and private sectors because of the additional consumer demands, with a variety of private sector employment opportunities directly and indirectly resulting from the realignment.

- **Direct Impacts.** The construction industry will be a direct primary beneficiary as construction of new housing will demand both skilled and unskilled jobs in the various building construction trades. Additional commercial development will be constructed to support the new population to be served. Accompanying this development will be construction and related jobs for the supportive infrastructure, including utilities and roads. The retail and service industries will be other primary beneficiaries of direct employment opportunities. Demand will be increased for household furnishings, clothing, food and other basic day-to-day necessities. Various service sectors will also benefit, including the real estate, finance, and insurance industries, and other personal services.

- **Indirect Impacts.** Indirect beneficial impacts will accrue as the increased demand for goods and services will foster the expansion of existing business or development of new business establishments. Additional indirect employment will be created as a result of the initial employment generated in the construction, retail trade and service sectors.

**5.4.2.14.3 Issue:** ***Dependency of Area's Economy on Fort Leonard Wood.*** As previously discussed and as also indicated in the EIFS Model for Existing Operations (Volume III, Appendix E), FLW is the economic engine of Pulaski County and the surrounding area. The EIFS Model projections indicate that the RTVs, or levels of significance, of the regional economic indicators are greatly exceeded by the RTVs of FLW's current operations in respect to direct and indirect generated business volume, income and employment. Currently, over 50 percent of the non-agricultural employment in Pulaski County and 13 percent of the employment in the ROI consists of military, federal, and civilian employment directly associated with FLW.

- **Direct Impacts.** The addition of the U.S. Army Chemical and Military Police schools to existing installation operations will further the economic dominance of FLW on the local and regional economy. As previously indicated, the direct economic impacts of the realignment will approximate one-third the economic impact of current installation operations in respect to the basic economic indicators. Thus, the proportion of military, federal and civilian employment will increase commensurately with the addition of the new missions.

- **Indirect Impacts.** The primary indirect long-term adverse impact is the potential continued over-dependency of the regional economy on FLW operations. However, it is anticipated that new businesses and industries will develop as a result of the synergistic effects of the expansion of FLW operations. This private sector development would contribute to a more diversified regional economy.

**5.4.2.14.4 Issue:** ***Availability and Desirability of Off-Post Housing.*** According to the local Boards of Realtors, in June, 1995 there were 900-1,000 residential properties on the market for sale in Pulaski, Texas, Laclede, Phelps, Maries and Dent counties. A survey of residential rental property managers and owners in June, 1995 indicated a limited rental market with an overall vacancy rate at five percent or less.

- **Direct Impacts.** An assumption was provided by FLW DRM that 10 percent of the realigned permanent party military population will reside on-post and 99 percent of students will reside on post. Based on this assumption, the EIFS Model projects a total demand of almost 1,600 housing units resulting from the realignment, with a demand for approximately 1,120 housing units in

Pulaski County. The majority of the remaining demand will be in Phelps County, Texas County and Laclede County. It is anticipated, however, that the demand for off-post housing will be considerably lower than projected by the model.
It is difficult to estimate the actual number of new housing units that will need to be constructed to accommodate the demands of the realigned population. There are currently a significant number of lower and medium priced housing units on the market. Certainly, many of the existing for-sale housing units on the market will be purchased by the incoming population. In addition, existing rental units (single family homes, mobile homes and apartments) will also be leased by a segment of this population.

Based upon current residency patterns, the greatest local demand will be in the St. Robert/Waynesville area, where 850-950 housing units could be in demand for rental and ownership by the realigned population. Current residency patterns and local real estate sources indicate that Plato (Texas County), Dixon (Pulaski County), Rolla (Phelps County), and Lebanon (Laclede County) will be other important secondary housing markets. Other communities which will be impacted include Richland, Crocker and Laquey in Pulaski County; Newburg and Edgar Springs in Phelps County; and Houston and Licking in Texas County.

Considering the potential long-term deployment of the new missions to Fort Leonard Wood, it is assumed that approximately 70 percent of the associated civilian population will purchase rather than rent a residence. Based upon this assumption and the current off-post residency patterns, it is estimated that there will be a demand for approximately 750-800 owner-occupied housing units in Pulaski County. Assuming that all of the existing 3-bedroom homes on the market for sale are purchased by the incoming population, there would be a residual demand for approximately 550-600 new owner-occupied housing units in Pulaski County. Based upon current residency distribution, approximately 80 percent, or 460, new houses would be constructed in the St. Robert/Waynesville area. According to local real estate representatives, the majority of the new construction would most likely occur in the unincorporated areas outside the St. Robert and Waynesville city limits

- **Indirect Impacts**. The existing patterns of land use will change with the platting of new residential subdivisions and development of supportive commercial and industrial land uses. The lack of land use controls (e.g. planning, zoning and building permits) in the unincorporated areas of some counties, especially Pulaski County, could result in ill-planned developments with adverse environmental impacts. This is cause for some concern as, according to the local real estate industry, the majority of the new residential development in the St. Robert/Waynesville area is anticipated to occur in the surrounding unincorporated areas of Pulaski County.

**5.4.2.14.5 Issue:** ***Impact on Municipal and County Revenues.*** Construction of new residential, supportive commercial and industrial development will enhance the local and regional tax base while simultaneously create new demands on the provision of municipal and county services.

- **Direct Impacts**. Direct long-term beneficial impacts will accrue to the tax base of the various communities in which new development occurs. This increased tax base will result in additional tax revenue in the form of real property taxes and utility taxes, in addition to personal property and sales taxes generated by the new population. According to EIFS projections total government revenues, including federal, state and local, would increase by $13.304 million while expenditures will increase by $6.646 million.

  The assumptions in subsection 5.4.2.14.4 form the basis for estimating the potential tax revenues that would be generated for local government bodies. Applying the current Pulaski County composite tax levy ($3.57/$100 assessed value (A.V.)) and assuming an average market value of $85,000/house, approximately $345,000 would be generated annually in new real property taxes for Pulaski County from new residential construction. Approximately $266,000 of this amount would be distributed to the Waynesville R-6 School District based upon their 1995 tax levy rate ($2.75/$100 A.V.). Any new residential development in St. Robert or Waynesville would generate

additional taxes in the form of municipal real property tax levies, which currently are 0.38/$100 A.V and 0.66/$100 respectively.

In addition to the above real property tax revenue there will also be new real property tax revenues generated by the supportive commercial and other development. Also, additional utility tax revenues on the new developments will be collected by the local taxing jurisdictions.

Additional sales tax revenues will also be collected in the retail trade and service sectors. As indicated previously, the EIFS models project additional direct and induced business volume (sales) of approximately $172 million annually as a result of the realignment. This would equate to annual sales tax revenue of $1.72 million if a one cent sales tax is assumed. Both St. Robert and Waynesville have a one cent municipal sales tax in addition to a 1/2 cent transportation tax. However, not all of the additional sales will occur in incorporated areas with a local sales tax. Furthermore, based upon a recent retail market study of Pulaski County (Gross, 1995) approximately 50 percent of the current potential retail market sales in Pulaski County is lost to other areas outside the county (e.g. Rolla, Lebanon, Osage Beach, Springfield, St. Louis). In addition, a portion of the retail sales market (13 percent) is lost to on-post purchases where no local sales tax is in effect. Thus, considering the above, approximately 37 percent of the total potential annual retail sales currently occurs in Pulaski County. Applying the same ratio to the new sales generated by the realignment population, it is estimated that Pulaski County would generate an additional $636,000 annually in new sales tax revenues. The remainder (50 percent) of sales tax revenue would be dispersed throughout the ROI and other non-ROI areas. In addition, retail sales in St. Robert or Waynesville would also incur a 1/2 cent transportation tax, and another 1/4 cent capital improvements tax in St. Robert.

- **Indirect Impacts**. Long-term indirect impacts would occur in respect to expansion or additions to the local and regional service delivery system financed from the new tax revenues. If the new revenues received are insufficient to finance the necessary service delivery systems, bond issues or tax levy increases could become necessary for municipal and county fiscal needs.

**5.4.2.14.6 Issue:** ***Tax Adjustments due to Change in Demand on Public Services and Infrastructure.*** The additional population, associated housing and other development will cause additional demands and expenditures for public services, including infrastructure (roads and utilities); public education; police, fire and emergency services; parks and recreation; and other public services.

- **Direct Impacts**. Municipal and county revenues will increase directly in the form of real property taxes, sales tax and other taxes commensurate with new development. School district revenues will also increase with a corresponding enhancement of the tax base. These revenues will be available to provide and finance the additional services demanded by the new development and population.

  Local municipal officials at this time do not foresee any tax levy increases as being necessary to finance the additional service delivery costs. Waynesville R-VI School District officials also indicate that no additional school district tax levy is planned to finance expansion and improvements to school facilities to accommodate the additional students associated with the realignment. In 1994 voters approved a ballot proposition to waive a rollback of a portion of the school district property tax levy. The amount of additional Federal Impact Aid (FIA) funds that will be received as a result of the realignment is undetermined at this time. Allocation of FIA funds is partially based upon student residency, with off-post residency (Category B funds) and on-post residency (Category A funds) allocation ranging from $150 to $1,500 per student respectively. Considering the district's cost of education per student ($4,000), the school district's finances could be adversely affected due to the imbalance between FIA funds received and actual per student costs.

- **Indirect Impacts.** The quantity and quality of public services could be indirectly impacted in either a positive or negative manner dependent upon the revenue/expenditure balance sheet of the local taxing entity.

**5.4.2.14.7 Issue:** ***Commitment of the U.S. Army to the Economic Viability of the Surrounding Area.*** Within an ever-changing world and associated military force structure adjustments there is no guarantee of any infinite or long-term continuation of current U.S. government, and military policies and programs. However, the establishment of the ITRO joint service training program at Fort Leonard Wood, and the realignment of the U.S. Army Chemical School and U.S. Military Police School would seem to indicate that the DOD has made a long-term commitment to FLW.

- **Direct Impacts.** Continued commitment of the U.S. Army to FLW will provide a stable, although non-diversified, local and regional economic base.

- **Indirect Impacts.** Long-term indirect impacts could occur as a result of the continuation of a lack of a diversified industrial and employment base. The continued dependence upon FLW as the economic engine of the region could result in a lack of effort and commitment on the part of the local officials to diversify the area's economic base. However, expanded operations at FLW could also indirectly provide a stimulus for the establishment and development of new industries and businesses resulting in a more diversified economic base.

**5.4.2.14.8 Issue:** ***Effect of Potential Contamination on Land Values.*** There is no anticipated potential contamination of off-post land resources that will occur as a result of the activities associated with the new training exercises and facilities. Representatives of the real estate industry at Anniston Alabama, adjacent to the current Military Police School and Chemical School exercises and facilities at FMC, indicate that the presence of these facilities has not had any negative impact on land values within the immediate surrounding area. Rather, certain industrial plants within the area have had much more of an adverse impact on the adjacent community because of pollution and contamination of soil and water resources from these facilities. Thus, the potential for land contamination and degradation of land values is more likely to occur in association with certain private sector industrial plants than with the BRAC related training exercises and facilities that are proposed for FLW.

- **Direct and Indirect Impacts.** There are no direct or indirect impacts as it has been determined that this is not a valid issue associated with the realigned missions.

**5.4.2.14.9 Issue:** ***Attractiveness of Area to Clean Industries and Businesses***

- **Direct Impacts.** The movement of the U.S. Army Chemical and Police schools to FLW will have no direct adverse influence on decisions related to the location of new businesses and clean industries in the surrounding area. There will be no direct adverse environmental or economic impacts which will negatively affect the attractiveness of the area for businesses and clean industries. However, as discussed in subsection 5.2.2.3.7, for new business or industry that would have particulate matter air emissions, the farther the source is located from FLW boundaries, the less any potential limit on growth. A new business or industry that would emit particulate matter may be limited if the location is close to FLW boundaries.

- **Indirect Impacts.** The realignment of these new functions to FLW will indirectly expand the market for industrial and business development opportunities. New and additional services will be created, and potentially new industries could be fostered by these new missions. Currently, almost 50 percent of the industrial base and manufacturing employment in the ROI is located in Laclede County and Texas County. Less than five percent of the total industrial employment in the ROI is in Pulaski County. Thus, there is a need for expansion of the industrial base for economic diversification in Pulaski County.

**5.4.2.14.10 Issue:** ***Fog Oil Training and the Tourism and Recreational Industries***

- **Direct Impacts.** Fog oil training will have no direct impact on the tourist industry in the FLW area. The primary tourist destination is the Lake of the Ozarks which is located 30-35 miles northwest of the FLW installation. Outdoor recreational activities located adjacent to FLW, such as canoeing, fishing and hunting, will also not be adversely impacted in a direct manner by the fog oil training exercises conducted on the installation (see subsection 5.2.2.15.B).

- **Indirect Impacts.** As with the current training exercises and programs, there will be curtailments or restrictions for on-post hunting and fishing activities during the field exercises. This could indirectly impact off-post recreation by creating a greater demand on these resources outside of the installation's boundaries.

**5.4.2.14.11 Issue:** ***Short-term Economic Gains Versus Environmental Losses***

- **Direct Impacts.** There will no long-term direct irretrievable environmental losses resulting from the proposed BRAC facilities and training exercises. On-post and off-post monitoring of the resource base is designed to eliminate or mitigate any environmental impacts from these activities. The economic gains realized from these new missions will be both short-term and long-term, benefitting the local and regional population and economy in the form of jobs, additional income and an expanded economic base.

**5.4.2.14.12 Issue:** ***Economic Impacts and Projections Resulting from the New Students (including Trainees).*** It is projected that the average daily training load at FLW will increase by 3,378 to a total of 8,181 as a result of the relocation of the Military Police School and Chemical School. This represents an approximate 70 percent increase over the 1995 baseline average daily training load of 4,803 at FLW. However, this increased training load from the realignment represents only a 10 percent increase over the 1990 average daily training load at FLW.

Implementation of any of the training method (RCP, OPTM (Army's Proposed Action), and EPTM) alternatives will result in similar impacts. The economic impacts and projections resulting from the daily and annual training of the new students (including trainees) will be the same under all alternatives. The additional spending power represented by the new students (including trainees) will impact the local and regional economy in a positive manner in respect to income generated, demand for goods and services, and employment. These beneficial impacts will be long term, and consist of both direct and indirect economic effects.

The magnitude of these impacts are portrayed in Appendix E (Volume III), Economic Impact Forecast System Model/Methodology. The EIFS Training Model was executed to project impacts regarding the basic economic indicators of business (sales) volume, employment and income generated by the students (including trainees) . It is noted that only the students (including trainees) income in the form of salaries is considered in this model for projection of economic impacts. The installation's annual operating costs for purchase of goods and services to support the new training missions are not considered in the EIFS Training Model. Rather these annual operating costs are included in the Standard EIFS Model for projecting the economic impacts of the "population movement" (Step 3) associated with the new missions. These impacts are subsequently discussed in subsection 5.4.2.14.1. In addition, the economic impacts of construction of the training facilities associated with the new missions are not considered in the analysis of the economic impact of the students (including trainees) , but rather under "facility construction" in subsection 5.3.2.14.

- **Direct Impacts.** Direct long-term beneficial economic impacts will accrue to the local and regional economy from the students (including trainees) on a recurring annual basis. As indicated in Appendix E, the direct annual economic impacts attributable to the new students (including trainees) consist of an increase of: $15,476,000 in regional business volume; 159 new jobs in the retail, services and industry sectors; and $2,254,000 in direct income to the above business sectors. The economic impact of the non-basic students (including trainees) who

reside on-post is not as great as that from an equal number of permanent party military residing off-post. This is because the average propensity to consume local goods and services by military students (including trainees) residing on-post is significantly less than that of off-post residing permanent party military. This difference is due primarily to the on-post students (including trainees) being provided housing and board. The primary economic impacts from the students (including trainees) occurs during the weekly graduation ceremonies when the students (including trainees) and their out-of-town family members place extra demands on the local and regional shopping, dining, boarding and service establishments. Since almost of the students (including trainees) will live on-post, there will be no direct impact on off-post housing from this component of the new mission.

- **Indirect Impacts.** Indirect long-term beneficial economic impacts will result from the multiplier effect of the initial spending of money by the students (including trainees) for goods and services, and the spinoff of new jobs from the employment directly generated from the trainee program. As projected in the EIFS Model, these annual indirect economic impacts include an additional $14,500,000 in business volume; 150 additional jobs; and an additional $2,112,000 in income. Total annual income generated, including salaries of the students (including trainees) and wages of workers in the retail, service, industry sectors, exceeds $62,000,000.

  Other indirect beneficial impacts will be the potential development of additional off-post retail, service and recreational establishments to serve the additional demands created by the increased training load at FLW. This new development will create new employment, expand the local tax base and generate new tax revenues.

## 5.4.2.15 Quality of Life

## 5.4.2.15.A Quality of Life

Implementation of the planned BRAC population relocations to Fort Leonard Wood will result in the following issue in respect to Quality of Life:

- Increase in demands on local public service delivery systems.

There will be no anticipated impacts to human health and safety as a result of the phased movement of personnel. A detailed discussion of human health issues for the different types of training and their alternatives to be transferred from FMC to FLW is at subsection 5.2.2.15.B.

**5.4.2.15.A.1 Issue:** ***Increase in Demands on Local Public Service Delivery Systems.*** The projected off-post population increase resulting from the realignment will place additional demands on municipal and county provided police, fire and emergency medical services. In addition, the new facilities and personnel associated with the realigned missions will create increased demands on similar on-post services.

- **Direct Impacts.** Long-term direct impacts will occur on off-post police, fire and emergency medical services within those communities that will experience the greatest effects of population relocation associated with the realignment. These communities include St. Robert, Waynesville and the surrounding area within which it is projected that approximately 90 percent of the relocated population will choose to reside.

  Municipal officials have not yet analyzed the potential impacts of the realignment on the future demands and needs of their fire and police protection service delivery system. However, both communities currently have plans for expansion of their existing service base. The city of St. Robert has plans to construct a new fire and police station in association with a new city hall at I-44 and Highway Y. This construction is planned for late 1996 or early 1997. The city also recently purchased a new fire truck to augment their existing equipment. The city of Waynesville has plans to construct a new fire station in 1997 or 1998 at an undetermined site and to purchase

a new fire truck. St. Robert plans to add two full-time officers to their police department, while Waynesville is also planning to increase the number of municipal police officers.

On-post fire protection facilities and equipment are currently inadequate. The Directorate of Public Works has plans for replacement of two of the three on-post fire protection facilities and for the purchase of additional fire fighting equipment. On-post security and law enforcement will be more than adequate to service the additional population.

- **Indirect Impacts.** Long-term indirect impacts could occur on the quality of off-post police, fire and emergency medical services in those communities which will experience the greatest effects of population relocation. These service delivery systems could be positively impacted if service delivery facilities and services are enhanced and expanded in accordance with community demands. Special bond issues or tax levies could possibly be necessary if revenues are not sufficient to supply the necessary services.

## 5.4.3.15.B Human Health and Safety

A discussion of human health issues for the alternative methods of training to be transferred from FMC to FLW is at subsection 5.2.2.15.B No health and safety impacts are anticipated as a result of implementing this alternative.

## 5.4.2.16 Installation Agreements

Implementation of the phased relocation of personnel to FLW will result in the following issue with respect to Installation Agreements:

- Development of new agreements to accommodate relocated units.

**5.4.2.16.1 Issue:** ***Development of New Agreements to Accommodate Relocated Units.*** With relocation of missions from FMC to FLW, new Interservice Support Agreements will be developed. These agreements would facilitate the relocation of the organizational units listed in Table B.3 in Volume III and their associated training and operations.

No impacts are expected to occur as a result of the development of new Interservice Support Agreements. New agreements would be based on current FLW agreements and would be similar in scope and nature. Current FLW Interservice Support Agreements specify that environmental compliance, and management and disposal of hazardous waste will be conducted in accordance with the FLW Hazardous Waste Management Plan, FLW 220-1, AR 200-1, AR 200-2 and all Federal, State and local environmental laws and regulations.

## 5.4.2.17 Operational Efficiency

Issues associated with the consideration of a "Total Early Move," a "Total Late Move," and a "Phased Move" movement of the military and civilian population are discussed in subsection 3.5.

**5.4.2.17.1 Total Early Move.** A "Total Early Move" Alternative would involve relocating all personnel and missions from FMC as soon as possible, prior to the completion of all receiving facilities at FLW. Moving troops and equipment to FLW prior to the completion of required support facilities would require use of extreme measures to provide temporary accommodations. This action could shorten the time that these missions continue at FMC, and maximize savings to the Army associated with reduced operations at FMC. However, this action would severely compromise the ability of the Military Police School and Chemical School to accomplish their missions, and the quality of training and operations for units currently stationed at FLW as well as the units to be relocated from FMC. Furthermore, a Total Early Move would have a more abrupt affect on communities at both FLW and FMC because the transitions would occur over a shorter period of time. Given these factors, it was determined that this alternative is not viable or

reasonable. Therefore, no further consideration of the Total Early Move Alternative will be provided in this EIS.

**5.4.2.17.2 Total Late Move.** This alternative would allow training operations to continue at FMC for the maximum amount of time. However, implementation of this alternative results in the following impacts:

- Delaying the initial property cleanup, disposal and reuse of lands at FMC; thereby resulting in increased economic impact on the community surrounding FMC.
- Extending the time period for full operations at FMC beyond implementation times envisioned by the BRAC Commission; thereby resulting in increased maintenance and operations expenses.
- Requiring the relocation of classes in session; thereby:
    - requiring students to move twice (once to FMC and then to FLW versus the Phased Move Alternative which would have classes in session at FMC continue until completed and the new class session start at FLW); thereby increasing personnel movement costs; and
    - result in interruption and disruption of classes in session prior to, during and immediately after their move reducing the amount of time available for instruction and lowering the level of skill proficiency that students would obtain during the affected classes.
- Requiring the maintenance of completed and available facilities at FLW until all facilities are completed and personnel relocated. These maintenance costs would be wasted since the facilities would be unoccupied.
- A more abrupt effect on communities at both FLW and FMC because the transitions would occur over a shorter time.

Given these factors, it was determined that although this alternative is feasible, it is not reasonable for the Army to implement this alternative because of increased operational costs, increased impacts on the civilian communities near FLW and FMC, and decreased training effectiveness. Therefore, no further consideration of the Total Late Move Alternative will be provided in this EIS.

**5.4.2.17.3 Phased Move Alternative (Army's Proposed Action).** This alternative would involve the relocation of personnel (and related missions and equipment) on a phased schedule tied to the availability of facilities to support specific mission requirements. It is anticipated that the relocations will be performed between scheduled class iterations, that the two schools and the related support elements will move independently, and that sections of each school will be able to move as the facilities required to support that section become available. Based on this analysis, it was determined that the phased movement of military and civilian personnel was the only alternative that was both reasonable and viable. No significant adverse impacts are anticipated to occur as a result of the phased movement of personnel from FMC to FLW with respect to operational efficiency.

## 5.4.2.18 Summary

The **Phased Move Alternative**, as discussed in subsections 5.4.2.2 through 5.4.2.17, will not result in any significant adverse impacts on the local community, although the increase in the number of construction workers during the February 1997 through March 1999 timeframe may have an adverse impact on the local civilian housing market by creating a large demand on local rents units.

# SUBSECTION 5.5

# Step 4 - Cumulative Impacts

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

### STEP 1 - TRAINING ANALYSIS

**2. Subsection 5.2.1 - Analysis of No Action Training Alternative**

Narrative Discussion
(Not Viable)

**3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**

**Training Alternatives:**
RCP Alternative →
OPTM Alternative (Army's Proposed) →
EPTM Alternative →

**Impact Analysis Elements:**
Narrative Discussion
Summary Table 5.20
Impact Matrix 1 (Volume II)

**4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**

**Training Alternatives:**
RCP Alternative →
OPTM Alternative (Army's Proposed) →
EPTM Alternative →

**Impact Analysis Elements:**
Narrative Discussion
Summary Table 5.21
Impact Matrix 2 (Volume II)

**5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**

**Training Alternatives:**
RCP Alternative →
OPTM Alternative (Army's Proposed) →
EPTM Alternative →

**Impact Analysis Elements:**
Narrative Discussion
Summary Table 5.22
Impact Matrix 3 (Volume II)

**6. Subsection 5.2.5 - Step 1 Summary**

Narrative Summary of Step 1 Training Analysis

**Conclusion** - RCP Alternative was Eliminated from Further Consideration.

### STEP 2 - FACILITIES ANALYSIS

**7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**

Narrative Discussion
(Not Viable)

**8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**

**Impact Analysis Elements:**
Narrative Discussion
Summary Table 5-32
Impact Matrix 4 (Volume II)

**9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**

**Impact Analysis Elements:**
Narrative Discussion
Summary Table 5.33
Impact Matrix 5 (Volume II)

**10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**

**Impact Analysis Elements:**
Narrative Discussion
Summary Table 5.34
Impact Matrix 6 (Volume II)

**11. Subsection 5.3.5 - Step 2 Summary**

Narrative Summary of Step 2 Land Use and Facilities Analysis

**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration.

### STEP 3 - POPULATION

**12. Subsection 5.4.1 - No Action (Population)**

Narrative Discussion
(Not Viable)

**13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**

**Impact Analysis Elements:**
Narrative Discussion

### STEP 4 - CUMULATIVE IMPACTS & MITIGATION

14. Subsection 5.5.3 - Evaluates:
Army's Proposed Training (OPTM),
Army's Proposed LU & Fac Plan (Comb. HQ & Inst.),
and Phased Move

**Impact Analysis:**
Narrative Discussion

15. Subsection 5.5.4 - Evaluates:
EPTM Training,
Army's Proposed LU & Fac Plan (Comb. HQ & Inst.),
and Phased Move

**Impact Analysis:**
Narrative Discussion

16. Subsection 5.5.5 - Evaluates:
Army's Proposed Training (OPTM),
Alternative 1 LU & Fac Plan (Combined HQ),
and Phased Move

**Impact Analysis:**
Narrative Discussion

17. Subsection 5.5.6 - Evaluates:
EPTM Training,
Alternative 1 LU & Fac Plan (Combined HQ),
and Phased Move

**Impact Analysis:**
Narrative Discussion

18. Subsection 5.5.7 -
Step 4 Summary, Conclusions & Mitigation

Narrative Discussion
and Summary Table Including
Mitigation Actions

**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above)

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# 5.5 STEP 4 - CUMULATIVE IMPACTS

## 5.5.1 INTRODUCTION

At the conclusion of the Step 1 analysis of training alternatives (subsection 5.2.5), the *RCP Alternative* was eliminated from further consideration. At the conclusion of the Step 2 analysis of Land Use and Facility Plan Alternatives (subsection 5.3.5), the *Alternative 2 Land Use and Facility Plan (Separate Headquarters)* was eliminated from further consideration. As explained in subsection 3.5, Step 3 was limited to an evaluation of the *Phased Population Move*. This evaluation/screening process results in four reasonable, composite BRAC implementation alternatives that are presented for cumulative impact analysis in this section. The four composite implementation alternatives include the:

1) Optimum Training Method (OPTM) (Army's Proposed Action) with the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction), and Phased Population Move (as discussed in subsection 5.5.3);

2) Environmentally Preferred Training Method (EPTM) with the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction), and Phased Population Move (as discussed in subsection 5.5.4);

3) Optimum Training Method (OPTM) (Army's Proposed Action) with Alternative 1 Land Use and Facility Plan (Combined Headquarters), and Phased Population Move (as discussed in subsection 5.5.5); and

4) Environmentally Preferred Training Method (EPTM) with Alternative 1 Land Use and Facility Plan (Combined Headquarters), and Phased Population Move (as discussed in subsection 5.5.6).

The cumulative impact analysis evaluates the direct and the indirect effects of implementing any one of these four composite implementation alternatives in association with past, present and reasonably foreseeable future Army actions at FLW, and the actions of other parties in the surrounding area (where applicable). The cumulative impact analysis has been prepared at a level of detail that is reasonable and appropriate to support an informed decision by the Army in selecting a preferred alternative. The cumulative impact discussion is presented according to each of the combined implementation alternatives listed above, and impacts are described for each of the 16 evaluation categories used throughout this document.

Following the presentation of each of the four composite implementation alternatives, a summary section (subsection 5.5.7) has been provided to compare impacts associated with each implementation alternative. This summary also provides a listing of all Army mitigation actions associated with implementing the Army's Proposed Action.

### 5.5.1.1 Definitions used in the Cumulative Effects Analysis

This section defines several key terms used in the cumulative effects analysis. These definitions supplement the definitions provided in subsection 5.1.3.

- **Cumulative Impact Analysis Area.** The cumulative impact analysis area includes that area that has the potential to be affected by implementation of BRAC actions at FLW. The boundary of the cumulative impact analysis area varies according to the resource evaluation category being considered. For many of the resource categories considered, the impacts of the Army's Proposed Action are not expected to extend beyond the installation boundaries, because the impact to the resource is negligible beyond the analysis area. For those categories, the cumulative impact analysis is appropriately limited to lands within FLW boundaries. The boundaries of the cumulative impact analysis area for each resource is identified near the beginning of each resource category discussion in subsection 5.5.3.

- **Impact Evaluation Criteria.** Impact evaluation criteria are used to define or identify the level of effect that results in a *significant* impact to the resource being considered. Impact evaluation criteria vary by resource category. Therefore, the introductory section for each resource category defines evaluation criteria that were considered where applicable.

- **Past Actions**. Past actions are defined as actions within the cumulative analysis area under consideration that occurred before the decision to relocate the U.S. Army Military Police School and Chemical School to FLW. These include past actions at FLW, and past demographic, land use and development trends in the areas that surround the installation. In most cases, the characteristics and results of these past actions are described in Section 4 (Affected Environment) of this EIS.

- **Present Actions**. Present actions include: 1) current operations at Fort Leonard Wood, and non-BRAC, funded construction projects at FLW (as described and evaluated in the Environmental Assessment of the Master Plan and Ongoing Mission (FLW, 1995c)); and 2) current resource management programs, land use activities and development projects that are being implemented by other governmental agencies and the private sector (where they can be identified) within the cumulative impact analysis areas.

- **Reasonably Foreseeable Future Actions**. "Reasonably Foreseeable Future Actions" are limited to those that have been approved, and that can be identified and defined with respect to timeframe and location.

- **BRAC Implementation Alternatives.** The cumulative impact analysis BRAC implementation alternatives (including the Army's Proposed Action) are listed in subsection 5.5.1 above, and defined in Section 2 and referenced appendices.

#### 5.5.1.2 Structure of the Cumulative Effects Analysis

The cumulative impact analysis is structured similar to the previous components of the impact analysis. The impacts of past, present and reasonably foreseeable future actions, in association with implementation of BRAC-related activities defined under each implementation alternative, are discussed with respect to each of the evaluation categories. The analysis of the first alternative, the Army's Proposed Action (Optimum Training Method (OPTM) in combination with the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) and the Phased Population Move), is the most extensive. The discussion for each of the three remaining implementation alternatives focuses on identifying impacts that are different from those anticipated from implementation of the first alternative.

Under the Army's Proposed Action, the resource category discussions begin with introductory paragraphs that discuss the analysis area for that resource; cumulative impact issues to be addressed; the impact evaluation criteria to be used in the analysis (where applicable); past and present actions; and reasonably foreseeable future actions. The impact analysis for each category follows in narrative format, under the section subheading of Cumulative Impacts. Analysts have identified and commented on past and present, and reasonably foreseeable future actions as applicable to their resource category and related analysis area. Cumulative impact discussions address both direct and indirect impacts. Each resource category discussion ends with a conclusion subsection that summarizes impacts, and identifies applicable mitigation measures for all significant adverse impacts.

## 5.5.2 SUMMARY OF PAST AND PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

The cumulative impact analysis included in this Final EIS has been expanded in response to comments received on the Draft EIS. In order to ensure that the cumulative impact analysis fully considers past, present and reasonably foreseeable actions within and around FLW, the EIS study team conducted over sixty additional interviews with private sector and governmental agency representatives that are

knowledgeable of past, present and future actions within the cumulative impact areas to be considered for each resource category. Organizations, individuals and agencies that were contacted during these additional interviews included:

- The U.S. Army and other Federal Agencies including: the US Forest Service; US Fish & Wildlife Service; US Environmental Protection Agency, and the Natural Resources Conservation Service;
- State Agencies including: Missouri Department of Conservation, Missouri Department of Natural Resources, Missouri Department of Transportation and the State of Missouri Clearinghouse;
- The three Regional Planning agencies located within the 9-county socioeconomic region of influence;
- County representatives (e.g. County Commissioners, County Assessors) from the nine counties within the Economic Impact Forecasting System (EIFS) economic "Region of Influence";
- Community officials and representatives (mayors, city staff, etc.) of 17 municipalities representing the larger communities within the EIFS Region of Influence, including those communities in closest proximity to FLW;
- Chamber of Commerce representatives;
- Industrial and Economic Development Authority representatives; and
- Local realtors.

Where available, additional studies and documents were collected through these interviews, and considered in the preparation of the following expanded cumulative impact analysis. Past actions within and around FLW are described in Section 4 (Affected Environment) of the EIS. The impacts of implementing the proposed BRAC actions are described in subsections 5.5.2 thorough 5.5.4. A summary list of past and present actions within and around FLW that have the potential to impact a wide range of resource issues is provided in subsection 5.5.2.1, while reasonably foreseeable future actions are identified in subsection 5.5.2.2. Both of these subsections have been structured to distinguish between on-post and off-post actions. Additional information regarding past, present and reasonably foreseeable actions that are applicable to a particular resource are described in the introductory sections to each resource category in subsection 5.5.3.

### 5.5.2.1 Past and Present Actions

Past and present (non-BRAC related) actions that have been considered in the analysis of cumulative impacts are identified below. These actions are grouped to indicate those to occur on-post and off-post.

**5.5.2.1.1 Past and Present On-Post Actions.** Past and present actions within FLW boundaries are summarized in this subsection. These actions and related environmental impacts are described in more detail in the Environmental Assessment of the Master Plan and Ongoing Mission (FLW, 1995c). Identified activities included the following:

- **Administrative Actions** that are required for the proper command and control of personnel involved in governmental, service contract, and interservice support agreement supported functions.

- **Airfield Operations** and maintenance of Forney Army Airfield for both military and civilian aircraft movements, including the 150-feet wide and 5,108-feet long runway with supporting taxiways, parking aprons, and other support facilities.

- **Facilities Maintenance and Repair** including real property maintenance and repair activities, day-to-day maintenance actions required to ensure that existing facilities, machinery (other than vehicles), and equipment are able to safely and effectively operate; and repairs including the replacement of deteriorated systems or elements with new items.

- **Fuel and Petroleum Products Storage and Dispensing** operations including the operation of remotely located fuel and petroleum products storage and dispensing facilities.

- **Grounds Maintenance** including the maintenance of the grounds at FLW as necessary to ensure the long-term viability of plant growth, reduce insect infestations while not eliminating or adversely effecting the food chain of the Indiana and gray bat colonies, reduce the potential for inadvertent power outages caused by trees and tree limbs falling onto power lines, and to maintain a professional, military appearance.

- **Hospital Operations** including the operation of General Leonard Wood Army Community Hospital (GLWACH), with medical incinerator, and the Troop Medical and Troop Dental clinics on the installation.

- **Installation Support Services** including the provision of commercial and community services, including such activities as the installation's community center, the commercial aspects of the community center that make it the installation's marketplace, the installation support service activities at FLW such as the operation of: Family, Unaccompanied Personnel, and Guest housing; dependent and continuing education programs; the on-post libraries; the Engineer Center Museum; nine active and seven inactive cemeteries; community services such as child care and development centers, teen activities centers, community centers, service clubs, labor unions, and service organizations; installation services such as police and fire protection, service clubs, the recycling center, solid waste disposal including a curbside program, laundry and dry cleaning services, and the DRMO; social services such as Army Emergency Relief, Army Community Services and religious programs; and commercial services such as the Exchange, Commissary, Mini-Marts, cafeterias, banks and credit unions, and the Post Office.

- **Construction and Alteration** including the construction, alteration, repair, rehabilitation and maintenance of buildings, structures, site improvements, and utility systems as required to ensure that assets are capable of meeting the facility requirements of changing educational initiatives and programs, administrative philosophies and organizations, weapons systems, and mission requirements. Construction activities included in the consideration of past and present actions include the existing facilities at FLW, plus construction projects currently in progress and funded for construction prior to the end of fiscal year 1999. Construction activities currently scheduled for completion prior to the end of fiscal year 1999 include:

    - Family Housing Improvements, Junior NCO Units, Phase III, Project Number (PN) 13574;
    - Engineer Qualification Range, PN 38626; and
    - Fire Station, PN 03222.

  Additional information concerning the scope of work involved in these projects is located in Appendix B of the Environmental Assessment of the Master Plan and Ongoing Mission (FLW, 1995c).

- **Natural Resources Management** including the continuation of FLW's Integrated Natural Resources Management Plan which is designed to enhance the existing diverse fish, wildlife and plant habitats present on the installation, and protection and enhancement of threatened and endangered species. This plan, and continued coordination with the US Department of Interior and the Missouri Department of Conservation, will guide ongoing management actions. Natural Resource Management policies and actions at Fort Leonard Wood include: harvesting of forest resources in a manner designed to create diverse wildlife habitats, using prescribed burning and control of wildfires to manage habitat; the establishment and maintenance of ponds which function as recreational fisheries; the establishment and maintenance of wildlife water units and sedimentation basins; a cave management plan which restricts the use of caves that provide bat habitat; continuation of an agricultural lease program; the rehabilitation and management of bivouac areas; the provision of artificial nest structures; the establishment and maintenance of game food plots; promoting the growth of native species and grasses; supplying fish habitat structures in conjunction with pond construction and management of existing ponds; providing adequate access to fishing areas; improving water quality by maintaining vegetative cover and minimizing soil losses from training areas; participation in the Monitoring Avian Productivity and

Survival (MAPS) projects which contribute to the DOD Partners in Flight plan for the conservation and management of NTMs; continuation of a forestry management program, that implements an uneven age management system designed to emphasize ecosystem management and biodiversity; identification and mapping of known or potential jurisdictional wetland areas; the reintroduction of unique species and natural habitat improvements designed to encourage these populations' growth; identification and mapping of known or potential areas that contain cultural resources; and the continuation of programs to reduce and eliminate damage to the environment such as the Installation Spill Prevention and Response Plan, the Hazardous Waste Minimization Plan, the Pollution Prevention Plan, and the Hazardous Waste Management Plan.

- **Forest Management** by the USFS on forest service lands within the installation boundary and U.S. Army timber operations on U.S. Army property, including:

    1) Previous USFS timber/forest operations on the USFS property that is leased by the U.S. Army including: Roubidoux Project - 265 acres (580,000 board feet); Drownout - 421 acres (board feet - unknown); and Greenbriar - 421 acres (620,000 board feet).

    2) Approximately 724 acres (2,363,000 board feet) have been or are currently being harvested from 13 forest management compartments on FLW land areas. These timber harvests are accomplished with technical assistance from the USFS. These harvests were accomplished through four timber sales including: TA 257 (302,000 board feet); Southwest (597,000 board feet); Tunnel Hollow (543,000 board feet); and Ballard Hollow (921,000 board feet).

- **Recreation** including the continuation of various activities intended to support the recreation needs of active and retired military personnel stationed in the FLW area and their dependents, including providing many of the facilities for use by the civilian employees at FLW as authorized on a space-available basis, and the continued operation of several activities (including hunting and fishing) which may be enjoyed by the entire community within established and enforced limits.

- **Road and Right-of-Way Maintenance** including the maintenance of roads (including concrete, asphaltic concrete, rock and gravel roads, parking areas, sidewalks, troop trails, and service drives) and rights-of-way as necessary to support existing operations.

- **Training** including the continuation of existing Programs of Instruction at the Engineer Center and Fort Leonard Wood which include both individual and group training. Depending upon the material being covered, instruction may be provided in a classroom, in an interior applied instruction area, or at a firing range, bivouac site, or training area. Training methods include the use of computer simulation, the use of live-fire weapons, the use of explosive and smoke grenades, the use of other explosives, and on- and off-road vehicle use.

- **Utility System** operation, maintenance and repair actions including: electrical, water, and gas distribution systems; storm and sanitary sewer collection systems; central heating and cooling plants; solid waste collection; paper and cardboard collection for recycling; and telephone, cable television and radio communications systems that must be operated and maintained to support continued training and operational requirements.

- **Warehousing and Supply Storage** operations including the maintenance, operation and execution of central warehousing and supply storage functions at FLW, including the receipt of deliveries, off-loading of materials, inspection of materials, inventory, marking of materials, storage, maintenance in storage, issue, turn-in, packing, crating and shipping of all classes of supply materials.

- **Vehicle Maintenance and Repair** activities including the maintenance of vehicles, and material as required to ensure that these items are able to function as desired.

Additional information on the types of activities included in each of these areas is provided in Appendix E of the Environmental Assessment of the Master Plan and Ongoing Mission (FLW, 1995c).

**5.5.2.1.2 Past and Present Off-Post Actions.** Past development and land use patterns within the FLW region are described in Section 4 (Affected Environment) of this EIS, and are considered as part of the environmental baseline conditions. The land use pattern around FLW includes a number of small to moderate size population centers, interspersed with large amounts of rural lands that are used for agriculture, recreation and general forested land areas. In addition, within the region surrounding FLW much of the land is owned and managed by the U.S. Forest Service.

Within a one-mile buffer area, which encompasses over 33,000 acres around the FLW installation, 19.2 percent is grassland or fields, 2.4 percent is developed, and 78.4 percent is covered with brush or forest. For comparison purposes, lands within FLW boundaries are approximately 8.7 percent grassland or fields, 8.0 percent developed, and 83.3 percent brush or forest. Within the one-mile buffer area around FLW, approximately 30 percent of the land is owned and controlled by the USFS, and the remaining 70 percent is privately owned. According to the most recent data source - Timber Resource of Missouri, Statistical Report (USDA FS, 1991) - the acreage of timber in Pulaski County increased by 450,000 acres between 1972 and 1989. This represents a 25.6 percent increase in forested land areas within this buffer zone around FLW over the 17 year period for which data was available.

Subsection 5.5.2 described the extensive interview and document review process that was initiated to identify other past and present actions in the region that should be considered in the EIS. A partial list of actions identified through this process, and that are considered in the cumulative impact analysis are listed below. Other actions that are pertinent to a particular resource evaluation category are listed at the beginning of the cumulative impact evaluation category discussions presented in subsection 5.5.3.

- **Natural Resource/Forest Management on USFS Lands.** The Houston-Rolla Ranger District of the Mark Twain National Forest is responsible for management and control of all lands around FLW within the Mark Twain National Forest. The ultimate goal of the USFS is to provide for multiple use and sustained yield of goods and services from the National Forest System lands in a way that maximizes long-term net public benefits in an environmentally sound manner. The following is a list of forest management goals and concerns: 1) Multiple Use Management; 2) Recreation Management; 3) Wilderness Management; 4) Wildlife Management; 5) Timber Management; 6) Range Management; 7) Transportation System Management; 8) Minerals Management; 9) Fire Management; 10) Soil, Water, and Air Management; and 11) Land Adjustment/Acquisition. The USFS has completed the following timber/forest operations within a 4 to 5 mile radius of the FLW installation boundaries since 1992: Dairy Queen - 197 acres (190,000 board feet); Democrat, Wagner, Milldam, and Wild Turkey - 690 acres (1,150,000 board feet); and Lonely Oak, Big Goober and Burnt Cabin - 1,183 acres (705,000 board feet).

- **Road, Bridge and Right-of-Way Maintenance and Construction.** Past and present activities include the routine, ongoing maintenance of Federal, state, county, and local highways, roads, and bridges. Contacts with MoDOT, county and local officials confirmed that emphasis is being placed on maintenance and repair of existing transportation systems. The only known present highway improvement project in the FLW area (Pulaski, Phelps, Dent and Texas Counties) is the Route 72, Rolla to Salem (Phelps County) resurfacing and upgrading project which involves widening of 1.8 miles from four to five lanes between Highway 63 to Route O.

- **Recreation.** The region around FLW is characterized by large amounts of publicly owned land (Mark Twain National Forest), and extensive private land holdings that are predominantly rural in nature. These areas (and the entire Ozark Region) are used for a wide range of recreational activities including hunting, foraging for foods, hiking, biking, camping, fishing, swimming, and canoeing.

- **Private (Civilian) Projects and Activities.** Private sector activities (past and present) around the boundaries of FLW that impact the natural and human environment include: 1) farming

operations, 2) logging activities, 3) quarry operations, 4) the operation of commercial and retail outlets, 5) the operation of small manufacturing and industrial plants (including clothing manufacturing, charcoal plants, power plants, barrel manufacturing, feed plants, boat manufacturing, dairy manufacturing, quarries, asphalt plants, pet food plant, sand/gravel facility, concrete and concrete materials plants, and lead mine/mill), and 6) the maintenance, repair and construction of facilities required to support these activities. The interaction of these different private (civilian) projects and activities in the past has resulted in:

1) the prominence of government, retail trade and services as the major employment generators within the region, with industrial development\employment being of less significance than on the state-wide level;
2) the establishment of Waynesville\St. Robert (Pulaski County), Rolla (Phelps County), Lebanon (Laclede County), Osage Beach (Camden County), St. James (Phelps County) and Salem (Dent County) as major regional activity centers;
3) the establishment and growth of the tourist and recreational industry in the Lake of the Ozarks area (Camden and Miller counties); and
4) the development of industrial uses, the majority of which are clean, light industries.

- **Regional Commerce and Growth Association.** The FLW Regional Commerce and Growth Association (serving Pulaski County and the cities of Crocker, Dixon, Richland, Waynesville, and St Robert) is continuing to develop a growth management plan and program aimed at:

1) developing a consistent set of planning and development policies, and zoning and building code regulations to be applied equally to the cities and areas of Pulaski County surrounding FLW;
2) working with home builders to stimulate the construction of affordable single and multi-family units to accommodate the arriving soldiers and dependents who choose to live off-post;
3) working with Federal, state and local agencies to coordinate expansion/augmentation of public streets, water and sewerage systems serving the areas surrounding FLW; improve schools, commercial services, quality of life programs, and job opportunities for residents and arriving dependents; and
4) providing a method to coordinate planning activities in a manner designed to reduce potential conflicts between incompatible uses through the use of management tools similar to the Installation Compatible Use Zone (ICUZ) program.

- **New Construction and Facility Alterations.** Extensive contacts with officials and private sector representatives (as discussed in subsection 5.5.2) documented plans for construction activities in the surrounding civilian community. These plans included the continued development of civilian residential, farming and commercial activities in the community surrounding FLW, including providing required infrastructure to support residents of the community such as:

1) The construction of 1,400 - 1,500 residential units (excluding mobile homes) in 1996 within the entire nine-county socioeconomic Region of Influence (based on county assessor records), with Phelps County (Rolla), Camden County (Osage Beach\Lake of the Ozarks) and Laclede County (Lebanon) representing the primary centers of residential construction activity. Less than 100 new residential units were constructed in Pulaski County in 1996.
2) Local officials could not generally provide any quantified information regarding the past and present extent of commercial and industrial development within the nine-county Region of Influence. However, most such development is located within and adjacent to the incorporated communities, and are not generally expected to contribute to losses in significant natural resource values when the region is viewed as a whole.
3) the conversion of an estimated 1,000 acres or more of agricultural and open land annually to urban land uses, primarily residential.

- **Utility Systems.** The area is served by a wide range of utility systems including solid waste disposal and collection, sewage collection and treatment facilities, stormwater control facilities, electrical power generation and distribution, natural gas transmission line and distribution system, and water treatment and distribution systems. These service systems are routinely maintained and expanded into new development areas, the general extent of which are outlined above.

### 5.5.2.2 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions that have been considered for cumulative impacts include the following. The listing has been divided into items that are anticipated to occur on-post and those items that are anticipated to occur off-post in the surrounding community.

**5.5.2.2.1 Reasonably Foreseeable Future On-Post Actions.** Reasonably foreseeable future on-post actions that have been considered for direct and indirect effects in the cumulative impacts analysis included the continuation of past and present actions, as discussed in subsection 5.5.2.1.1. In addition, the following reasonably future actions have been identified:

- **Construction and Alteration.** Reasonably foreseeable future construction and alteration projects within FLW boundaries include non-BRAC projects that are currently defined, programmed and currently funded for preparation of construction plans and specifications. These projects all support current on-going FLW missions and are primarily for the renewal or replacement of existing facilities. The projects include:

    - Air Conditioning Plant, Project Number 19357;
    - Ammunition Renovation Shop, Project Number 25898;
    - Applied Instruction Facility, TA 244, Phase I, Project Number 02196;
    - Army Physical Readiness Training Facilities, Project Number 16383;
    - Barracks Modernization (1000 Area), Project Number 19592;
    - Combat Bridging Complex, TA 250, Project Number 19555;
    - Combat Training Group Complex, Project Number 23264;
    - Crew Served Weapons Facility, Project Number 23302;
    - Demolition Range 33 Upgrade, PN 23265;
    - Field Engineering Complex, TA 206, PN 19551;
    - Mechanical Electrical Life Safety Upgrade, PN 23262;
    - Range 16 Upgrade, LOHAM, PN 13960;
    - Range Water Distribution System, PN 02257;
    - Religious Education Facility, PN 19604;
    - Traffic Modifications, PN 19563;
    - Transient Billets (RECBN), PN 15751;
    - Upgrade Night Fire Range 9, PN 23301;
    - Warehouse Complex, Phase I, PN 19589;
    - Whole Barracks Renewal (600 Area), PN 41121;
    - Whole Barracks Renewal (700 Area), PN 33732;
    - Whole Barracks Renewal (1700 Area), PN 39165;
    - Whole Neighborhood Revitalization, Project Number 13328; and
    - Whole Trainee Barracks Renewal, Project Number 23299.

    Additional information concerning the scope of these projects is located in Appendix B of the Environmental Assessment of the Master Plan and Ongoing Mission (FLW, 1995c).

- **Forest Management.** Fort Leonard Wood has completed the fieldwork portion of an installation-wide forest inventory. These data will be used to revise the forest management plan, which will include designation of specific areas as old-growth. Timber harvests occur in upland hardwood or pine stands. Current timber sale contracts exist for the harvest of 1,274,000 board feet of timber on 500 acres within nine forest management compartments. This timber is contained in four sales: Old Mule (452,000 board feet) and TA 257 (302,000 board feet) from fiscal year 1996

contracts; and Bloodland Tower (243,000 board feet) and Raccoon Ridge (277,000 board feet) from 1997 contracts. The installation will continue to inventory and harvest timber at similar sustainable rates as identified in the Integrated Natural Resources Management Plan. Due to the abundance of sensitive cultural and natural resources, commercial timber harvests do not occur in riparian zones. Forest management activities in riparian zones will be directed at enhancing sensitive resources.

**5.5.2.2.2 Reasonably Foreseeable Future Off-Post Actions.** Reasonably foreseeable future off-post actions that have been considered for direct and indirect effects in the cumulative impacts analysis included the continuation of present management actions and development trends, as discussed in subsection 5.5.2.2.1. In addition, the following reasonably future actions have been identified:

- **Continuation of Private (civilian) project development and activity** trends including:

    1) the conversion of an estimated 1,000 or more acres of agricultural and open land annually to urban land uses, primarily residential, within the nine-county socioeconomic Region of Influence;
    2) the construction of an estimated 1,000 - 1,500 new housing units annually within the total nine-county socioeconomic Region of Influence;
    3) the construction of new single family housing on 1,600 currently platted, but unbuilt, lots in Pulaski County, primarily in unincorporated areas adjacent to existing municipal boundaries;
    4) the continuation of trends toward the concentration of growth and development within and adjacent to the current regional economic centers (e.g. Rolla, Lebanon, St. Robert\Waynesville, Camdenton, Osage Beach, Lake of the Ozarks);
    5) the continuation in the trend for the development of larger lot (1-3 acres) residences in small dispersed subdivisions or individual lots within the open unincorporated areas of the region;
    6) the continued growth of the resort and recreational industry around the Lake of the Ozarks which is approximately 75 miles from the FLW installation boundaries;
    7) the continued trend of relatively clean, light industries operating and locating within the region; and
    8) the continued development of industrial parks within and adjacent to the larger communities within the region (e.g. Lebanon, Rolla).

- **Continued Natural Resource/Forest Management on USFS Lands.** Based on interviews with representatives of the Houston-Rolla Ranger District of the Mark Twain National Forest, and review of the Land and Resource Management Plan for the Mark Twain National Forest, the following reasonably foreseeable future actions have been identified:

    1) A slight upward trend in the projected amount of timber that will be harvested from the Houston-Rolla Ranger District of the Mark Twain National Forest in the future. The USFS manages the forest for a sustained yield, and since the USFS is acquiring land as funds become available, it is likely that the amount of timber harvested will continue a slight upward trend along with the increase in USFS land.
    2) The harvesting of approximately 2,674,000 board feet of timber using a variety of cutting methods dispersed over about 7,169 acres of National Forest Land as described in the Environmental Assessment from the Nick's Cemetery Area. Other actions that will occur as a result of the Nick's Cemetery project include: the reconstruction of 1.7 miles of existing forest roads and construction of 2.7 miles of new forest roads from the Nick's Cemetery Area; the use of prescribed fire for habitat improvement and maintenance on 526 acres in the Nick's Cemetery Area; the designation of 1,595 acres of old growth forest in the Nick's Cemetery Area; the pre-commercial thinning of 255 acres of young suppressed timber in the Nick's Cemetery Area; and maintenance of 543 acres of open/semi-open animal habitat by mechanical means.

3) The continued management of the Evening Shade Project which consists of approximately 10,597 acres total. Of this total approximately 6,084 acres are private lands and 4,513 acres are USFS property. Approximately 60 percent of the private land within the Evening Shade Project area has been cleared and converted to cool season grasses. The USFS proposes to implement the following management activities: create 99 acres of early successional oak-hickory woodland community through regeneration cuts; implement shelterwood cuts that leave 30-40 percent of overstory stock on 44 acres to encourage the development of oak-hickory seedlings to perpetuate this forest type; implement group-selection with improvement cuts on approximately 155 acres which will initiate the development of uneven-age conditions; implement a single tree selection cut for approximately 256 acres of oak forest; commercially thin 8 acres of oak forest; thin 683 acres of pine forest that consists of 14 acres of commercial and 669 acres of pre-commercial thinning; designate 98 acres of old growth; maintain 225 acres as open/semi-open land (through the use of prescribed fire and mechanical methods) which includes maintaining savannas, glades, and other open lands; restore open woodland/savanna on 154 acres using commercial thinning and prescribed fire; reconstruct 1.7 miles of old road to improve transportation access; and close, obliterate, and revegetate 1.0 mile of old road not needed for access.
4) Prepare environmental documentation for a forest prescription on Management Area 3.4-18 within the next two to five years. Approximately 1.5-2.5 million board feet of timber will be harvested through a variety of timber harvest techniques.

- **Road, Bridge and Right-of-Way Maintenance and Construction.** Reasonably foreseeable future roadway and bridge construction (funds included in 3-year program) within Pulaski, Phelps, Dent and Texas Counties include:

1) Route O (Phelps County) - widen shoulders, resurface 13.3 miles from Route 72 to Route OO; also replace or upgrade bridge (funded in 3-year program).
2) Route 28 (Pulaski County) - replace two bridges over Gasconade River north of Waynesville (funded in 3-year program).
3) Route 133 (Pulaski County) - replace bridge over Gasconade River south of Richland (funded in 3-year program).
4) I-44 (Pulaski County) - resurfacing of east\west bound lanes between Route H and I-44 Business Route in Waynesville\St. Robert area (funded in 3-year program).
5) I-44 (Pulaski County) - resurfacing east-bound lanes between Route 17 and I-44 Business Route (funded in 3-year program).
6) Route 17 (Texas County) - grading, paving; replace bridge south of Summersville (funded in 3-year program).
7) Route 63 (Texas County) - resurface 3.6 miles and widen bridge over Brushy Creek north of Houston (funded in 3-year program).

Other highway projects are being discussed and considered as part of MoDOT long-range plans. However, these projects are highly speculative, and are not considered to be reasonably foreseeable.

# SUBSECTION 5.5.3

# Evaluates - Optimum Training Method (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Instruction), and Phased Move

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion<br>(Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion<br>(Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion<br>(Not Viable) | **14.** Subsection 5.5.3 - Evaluates:<br>Army's Proposed Training (OPTM),<br>Army's Proposed LU & Fac Plan (Comb. HQ & Inst.),<br>and Phased Move<br>**Impact Analysis:**<br>Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:**<br>RCP Alternative →<br>OPTM Alternative (Army's Proposed) →<br>EPTM Alternative →<br>**Impact Analysis Elements:**<br>Narrative Discussion<br>Summary Table 5.20<br>Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:**<br>Narrative Discussion<br>Summary Table 5-32<br>Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:**<br>Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:**<br>Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives In Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:**<br>RCP Alternative →<br>OPTM Alternative (Army's Proposed) →<br>EPTM Alternative →<br>**Impact Analysis Elements:**<br>Narrative Discussion<br>Summary Table 5.21<br>Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:**<br>Narrative Discussion<br>Summary Table 5.33<br>Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:**<br>Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:**<br>RCP Alternative →<br>OPTM Alternative (Army's Proposed) →<br>EPTM Alternative →<br>**Impact Analysis Elements:**<br>Narrative Discussion<br>Summary Table 5.22<br>Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:**<br>Narrative Discussion<br>Summary Table 5.34<br>Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:**<br>Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.5.3 CUMULATIVE IMPACTS OF ARMY'S PROPOSED ACTION: Optimum Training Method (OPTM); Army's Proposed Land Use and Facility Plan; and Phased Population Move

### 5.5.3.1 Introduction

The cumulative impacts of implementing the Army's Proposed (Optimum) Training Method (OPTM) in combination with the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) and the Phased Population Move are presented in this subsection. These impacts are presented under the same 16 resource category headings that have been used throughout this document including:

- Land Use and Training Areas;
- Air Quality and Climate;
- Noise;
- Water Resources (including Floodplains, Surface Water and Hydrogeology/Groundwater);
- Geology and Soils;
- Infrastructure;
- Hazardous and Toxic Materials;
- Munitions
- Permits and Regulatory Authority;
- Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources);
- Cultural Resources;
- Sociological Environment;
- Economic Development;
- Quality of Life (including Human Health and Safety);
- Installation Agreements; and
- Operational Efficiency.

### 5.5.3.2 Land Use and Training Areas.

**5.5.3.2.1 Introduction.** The cumulative effects of the proposed action on land use and training areas include potential impacts to on- and off-post land use in the form of incompatible development.

**5.5.3.2.1.1 Analysis Area.** The cumulative impact analysis area for land use and training areas is defined by the area encompassed by the FLW installation and the four counties adjacent to the installation (Laclede, Phelps, Pulaski and Texas) with Pulaski County being a more specific area of analysis. The greatest direct and indirect impacts of the proposed action are expected to occur within this four-county area, and anticipated to be most concentrated in the communities of St. Robert and Waynesville in Pulaski County.

**5.5.3.2.1.2 Past and Other Present Actions.** The installation is located in a predominantly rural area, and is partially bordered on all sides by portions of the Rolla-Houston unit of the Mark Twain National Forest. Agriculture, pasture and forest lands dominate the landscape in this region. Timber cutting also occurs within several areas of the Mark Twain National Forest adjacent to or in close proximity to the installation boundaries. Scattered rural residential development occurs throughout most of the area, with some pockets of residential development concentrated within an area south of the Installation's south gate. More recent residential development consists of the construction of new residential subdivisions within the unincorporated areas of the county adjacent to municipal corporate boundaries. Urban development within the immediate area is concentrated north of FLW in the Waynesville/St. Robert area which extends on both sides of Business Loop I-44.

Within the last 20 years, extensive commercial development (relative to the surrounding rural area) has occurred along Spur I-44 between the Installation's main gate and I-44. Lebanon (Laclede County) and Rolla (Phelps County) are other major urban centers in the area of analysis, with Lebanon being the industrial center of the area and Rolla the institutional center with the presence of the University of Missouri-Rolla and the Rolla Technical Institute. Past and other present actions which have resulted in, or have the potential to result in, direct and indirect effects on land use include:

- Ongoing mission activities at FLW;
- Ongoing management, including timber cutting, of the Mark Twain National Forest;
- Development and ongoing management of FLW, including military training activities and the redesignation of land use and training areas to meet changing mission requirements;
- Operation and management of FLW training and support missions within the existing installation boundaries and within Forest Service holdings as authorized by mutual agreement;
- Establishment of the Fort Leonard Wood Regional Commerce and Growth Association in Pulaski County and the cities of Crocker, Dixon, Richland, Waynesville, and St. Robert (intended to provide a method to coordinate planning activities and thereby reduce the potential for conflicts between incompatible uses through the use of management tools similar to the Army's ICUZ program);
- Construction of new off-post housing, primarily in Pulaski County, to meet the housing demands of the realigned population;
- Conversion of agricultural and open land to urban uses, primarily residential;
- Development of supportive commercial and industrial land uses, primarily along major transportation routes; and
- Ongoing agricultural and forestry activities in the area surrounding FLW.

**5.5.3.2.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered under this resource evaluation category include:

- Minor expansion of Forest Service holdings as land is purchased or donated;
- Redesignation of the installation's land use and training areas to meet changing mission requirements;
- Construction of new single family housing on 1,600 currently platted, but unbuilt lots in Pulaski County;
- Concentration of new residential development in the unincorporated areas primarily adjacent to existing municipal boundaries;
- Dispersed residential development in the rural areas near the installation boundaries.

**5.5.3.2.2 Army's Proposed Action.** Elements of the Proposed Action which have resulted in direct and indirect effects to land use and training areas include:

- Expansion of the training activities currently conducted at FLW to include the training associated with the US Army Chemical School and the US Army Military Police School which will require the redesignation of land use areas within the cantonment and the reallocation of several training areas to meet changed mission requirements; and
- Expansion in the number of housing units in the surrounding civilian community to support the additional (military and civilian) personnel that will be relocated to FLW as a result of the proposed action.

**5.5.3.2.3 Conclusion (including Mitigation).** It is anticipated that implementation of the proposed action in association with past, other present and reasonably foreseeable future actions will result in:

- beneficial modifications to the existing on-post land use patterns within the cantonment area as noted in subsection 5.2.2.2.1; and
- modification of existing off-post land use relationships associated with the development of additional civilian residential and commercial activities in the urban and rural communities surrounding FLW.

Neither of these impacts are considered to be significant. Continued coordination between the installation and the Fort Leonard Wood Regional Commerce and Growth Association in Pulaski County and the cities of Crocker, Dixon, Richland, Waynesville, and St. Robert should help to eliminate or reduce the potential for conflicts between on- and off-post activities. These ongoing coordination efforts, and the additional residential and commercial development near the installation, should augment continued efforts to improve the appearance of the civilian and military facilities in the area. Ongoing initiatives being implemented by the surrounding communities are expected to improve planning and land use controls which should ensure that future development is located in appropriate zones. No mitigation is necessary.

#### 5.5.3.3 Air Quality & Climate

**5.5.3.3.1 Introduction.** The largest quantity of air emissions related to the Army's Proposed Action are *particulate matter that is 10 microns or less in diameter* (PM-10) and *volatile organic compounds* (VOCs). The proposed fog oil training that is part of the Proposed Action represents the primary source of these emissions. Therefore, the air quality analyses presented throughout this EIS (including this cumulative impact discussion) focuses on consideration of PM-10 and VOCs. The National Ambient Air Quality Standards (NAAQS) provide threshold standards for PM-10 and for ozone, which is a by-product resulting from the photochemical reaction of nitrogen oxides and VOCs. A significant adverse impact occurs for any individual or cumulative implementation scenario which is projected to exceed NAAQS for PM10 or ozone.

This Final EIS has been expanded to include the results of cumulative air dispersion modeling for PM-10 to quantify the potential ambient air quality impacts. The purpose of the air quality cumulative impact analysis is to determine if the air emission sources associated with the Army's Proposed Action, in association with other past, present and reasonably foreseeable actions, will cause an exceedance of the NAAQS. Prior to conducting the dispersion modeling, the emission sources, background concentrations, and model type were coordinated with the U.S. Environmental Protection Agency, Region VII and the Missouri Department of Natural Resources. Emission sources used in the model are those that are contained in MDNR's inventory for the region surrounding FLW, and emission sources associated with implementation of the Army's Proposed Action. For purposes of the air quality analysis, ambient air has been defined as air outside of the FLW boundaries and within the cantonment area of FLW. This definition is consistent with the existing fog oil air permit (MDNR Air Permit #0695-010 dated June 7, 1995 as included in Vol. III, Appendix J of this FEIS).

The Army fully intends to implement training levels that are in compliance with Federal and state permits, regulations, and standards, including the NAAQS. Review of this section (and prior subsections of the EIS) indicate that full implementation of the Army's Proposed Action (as it relates to fog oil training at OPTM levels) would result in exceeding the NAAQS for 24-hour PM-10 based on conservative dispersion modeling. Therefore, the cumulative impact analysis quantifies what level of mitigation (through reductions in the quantity of fog oil to be used or other sources) will be necessary to reduce PM-10 air quality impacts to acceptable levels. The cumulative impact analysis demonstrates that all daily and annual ambient air concentrations resulting from the Army's Proposed Action, in association with other past, present and reasonably foreseeable future actions, are within the NAAQS for PM-10 when all fog oil permit conditions in the existing air permit (including maximum annual and daily fog oil use levels) are met.

Air dispersion modeling from an individual installation cannot accurately be performed to predict ambient air quality impacts from VOCs since ozone formation is based on regional air quality parameters. Therefore, the mechanism for ensuring compliance with ozone NAAQS is ambient air monitoring. Ambient air monitoring will be conducted in and adjacent to FLW for both PM-10 and ozone to ensure compliance with the NAAQS.

Supporting information regarding air quality analysis methodologies (including emission factors and calculations), air quality modeling, and the cumulative impact analysis presented herein is provided in the *Air Quality Technical Reference Document: Relocation of the US Army Chemical School and US Army*

*Military Police School to FLW* (COE KC, 1997a). This technical reference document is located in the repositories identified in subsection I.5 of this EIS.

**Conformity Rule.** Fort Leonard Wood is located in an air quality attainment area, thus the General Conformity Rule does not apply. No further documentation (including the Record of Non-Applicability) is required for actions which are not subject to the General Conformity Rule.

**5.5.3.3.1.1 Analysis Area.** The air dispersion modeling analysis area that was defined by MDNR as part of the fog oil permitting process (50-kilometer radius from the center of the installation) was used as a starting point in defining an appropriate area for the air cumulative impact analysis. Within this 50 kilometer area, the greatest concentrations of PM-10 from existing sources occurred either near the installation or greater than 30 kilometers from the installation. For locations identified to have high predicted PM-10 concentrations at distances greater than 30 kilometers from the installation, the primary contributor was a source located near the high predicted concentration point, not a source associated with FLW. Since FLW's contribution to air quality conditions 30 kilometers or greater from the installation were negligible, those receptors were not evaluated in the cumulative analysis.

Fort Leonard Wood's contributions to ambient air conditions were greatest near the installation, thus the greatest cumulative impacts (existing emission sources plus the Army's Proposed Action emission sources) will occur near the installation. Therefore, the analysis area for the cumulative dispersion modeling was confined to a 14-kilometer radius from the center of the installation. Fourteen kilometers was used because it is far enough from the installation that it would capture the greatest cumulative impacts. However, all major sources within 50 kilometers of FLW were used in the model runs because some sources could contribute to the ambient air impacts within the 14 kilometer area. The intent of the dispersion modeling conducted for the cumulative analysis was to determine the level of impact associated with emissions from the Army's Proposed Action (in association with other past, present and future actions) and to determine compliance with the NAAQS. This analysis area captures the highest existing sources impacts and any potential exceedances of the NAAQS as a result of the Army's Proposed Action in the ambient air surrounding FLW.

**5.5.3.3.1.2 Past and Other Present Actions.** Past and other present actions are reflected in the existing baseline conditions as presented in Section 4, Affected Environment. The twenty-eight **existing emission sources** at or near FLW that were included in the air dispersion modeling have been coordinated with MDNR. Example of past and present actions or facilities (including the twenty-eight sources) which have resulted in, or have the potential to result in, direct and indirect effects on air quality due to air emissions include:

- prescribed burns and vehicle emissions during timber operations by the Forest Service;
- development and operation of industrial activities on the installation and in the surrounding community;
- heating and cooling of facilities;
- operation of vehicles and equipment;
- farming operations;
- training operations at FLW including heavy equipment training and quarry operations;
- clothing manufacturing;
- charcoal plants;
- power plants;
- barrel manufacturing;
- feed plants;
- boat manufacturing;
- dairy manufacturing;
- quarries;
- asphalt plants;
- pet food plant;
- sand/gravel facility;
- concrete and concrete materials plants; and

- lead mine/mill.

To account for minor emission sources not included in the model such as fire places, mobile source exhaust, gravel/dirt roads with vehicle traffic, and other minor sources, a PM-10 background concentration must be added to the modeled PM-10 concentrations and then compared to the NAAQS (see subsection 5.2.2.3.7). For cumulative modeling, a 24-hour PM-10 background concentration of 39 $\mu$g/m3 was added to the existing sources and the emission sources predicted for the Army's Proposed Action. This background concentration was coordinated with MDNR (COE KC, 1997a) and used for the EIS and the air permit applications.

Emissions from FLW current operations are summarized in Table 5.56 below. It should be noted that there are other air emission sources on post, but are not required to be included in the annual EIQ. Typical emission sources which are not included in the EIQ include unpaved roads (except at the quarry), firing of ammunition, smoke pots, smoke grenades, lawn mowers, mobile sources, laboratories, prescribed burns, FFE training, demolitions, heavy engineer equipment and transportation equipment training and use, etc. For purposes of the dispersion modeling, particulate emissions from these sources are included in the model through the PM-10 background concentration.

**Table 5.56:**
**Estimated Air Emissions From Current Operations at Fort Leonard Wood[1] (Tons per Year)**

| Operation Categories | PM10 | SOx | NOx | VOC | CO |
|---|---|---|---|---|---|
| Asphalt | 0.04 | 0.19 | 0.03 | 0.00 | 0.00 |
| Boiler | 0.63 | 29.01 | 19.19 | 0.36 | 4.71 |
| Degreasing | 0.00 | 0.00 | 0.00 | 2.37 | 0.00 |
| Fuel Storage | 0.00 | 0.00 | 0.00 | 11.56 | 0.00 |
| Generator | 0.10 | 0.09 | 1.38 | 9.93 | 0.30 |
| Incinerator | 0.05 | 0.00 | 0.03 | 0.09 | 0.00 |
| Miscellaneous | 0.16 | 0.00 | 0.00 | 55.43 | 0.00 |
| Paint Booth | 0.00 | 0.00 | 0.00 | 10.13 | 0.00 |
| Pesticide/Herbicide | 0.00 | 0.00 | 0.00 | 0.74 | 0.00 |
| Quarry | 8.98 | 0.00 | 0.00 | 0.00 | 0.00 |
| Space Heating | 2.51 | 0.00 | 33.88 | 1.22 | 6.45 |
| Sterilizer | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| Wastewater Treatment | 0.00 | 0.00 | 0.00 | 2.76 | 0.00 |
| Woodworking | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Emissions (tons per year) | 12.47 | 29.29 | 54.51 | 94.84 | 11.46 |

Note: 1 Based on 1995 FLW Emissions Inventory Questionnaire.

*Source: Harland Bartholomew & Associates, Inc.*

**5.5.3.3.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions have been considered in evaluating the cumulative air quality impacts. The types of actions expected to occur have been divided into those that are anticipated to occur on-post and those that are anticipated to occur off-post in the surrounding community.

**On-Post.** Continued operation and management of training and support missions at FLW is reflected in the existing baseline conditions, presented in Section 4, Affected Environment. Other reasonably foreseeable future actions on-post involve the construction of non BRAC-related new facilities or modernization of existing facilities which generates particulate matter (dust). These construction activities are considered to have a temporary direct impact on local air quality because they are considered to be a non-recurring activity. For PSD modeling purposes, PM-10 emissions resulting from BRAC construction will occur before fog oil training commences and therefore construction emissions are incorporated as background emissions which do not consume PSD increment.

The present airfield at FLW, Forney Army Airfield, is being considered for development and operation as a joint-use facility that will provide aviation services to the local community and continue to provide service to FLW. Currently the airport functions primarily as an Army airfield with commercial service on a limited basis. The feasibility study of the joint-use airfield has been completed, however the type of aircraft and frequency of flights are not defined, therefore an air quality analysis cannot be conducted. Fort Leonard Wood will participate in an environmental review process once the airport plans are finalized. The environmental review process will include an evaluation of air quality in addition to the other resource categories.

**Off-Post.** For off-post activities, both the Missouri Department of Transportation (MoDOT) and Missouri Department of Natural Resources (MDNR) were consulted regarding projects that may potentially impact air quality. These two organizations have the most accurate information regarding activities that potentially would impact air quality. MDNR is knowledgeable about other permits being pursued or emission sources possibly requiring air permits within the FLW area. The MoDOT is knowledgeable regarding plans for highway expansions or construction of new highways which would provide data about the potential increase in vehicle traffic. MDNR was not aware of projects that would significantly impact air quality within the analysis area.

MoDOT has identified seven reasonably foreseeable future highway improvement projects as listed in subsection 5.5.2.2.2. All of these projects are limited to routine improvements to existing roadways. The capacity of these roadways will not be significantly modified as a result of these improvements, and they are not anticipated to result in increased or decreased emissions. Therefore the potential impacts of these projects have not been included in the cumulative dispersion modeling analysis for PM-10.

The U.S. Forest Service will continue to conduct prescribed burns and generate vehicle emissions during timber operations as part of their on-going management of forest areas for biodiversity. Prescribed burns typically occur between mid-February and mid-April. These burns typically occur less than 10 days per year and are usually completed in approximately 4-6 days. The only potential impact to air quality from the prescribed burns and vehicle emissions during timber operations would be short-term (temporary) impacts. Under Missouri law, the U.S. Forest Service is not required to have an air permit for prescribed burning in the Houston/Rolla Ranger District. Emissions associated with the U.S. Forest Service are included in the background data and part of the Affected Environment described in Section 4.

The U.S. Forest Service has prepared an Environmental Assessment for the Evening Shade Project and one is being prepared for the Nick's Cemetery Area Project. There are no policy or procedure changes associated with these two projects from past and current practices. Based on the review of the Evening Shade Project EA, the air emissions from the engine exhaust are negligible. The emissions from the prescribed burns would cause a temporary and local decrease in air quality (primarily due to the increase in particulate emissions) near the community of Evening Shade, Highways AW and 17.

In addition to the primary off-post activities described above that may potentially impact air quality, additional activities have been identified in subsection 5.5.2.1.2 that may result in air emissions. These activities include:

- continued operation and management of civilian residential, farming and commercial activities;
- continued conversion of agricultural and open land to urban land uses;
- expanded use of natural gas due to the installation of a natural gas transmission line in the area;
- continued construction of new housing units;
- continued growth and development within the region; and
- continuation of the predominance of clean, light industries within the region.

These activities reflect continuing development trends in the region as further described in Section 4. Construction activities, agricultural activities, and development activities are incorporated into the air dispersion model as background data since these potential air emission sources are on-going. The installation of a natural gas transmission line in the area will expand the use of natural gas as a heating source compared with past practices of using heating oil. This has the potential to reduce overall air

emissions as further discussed in subsection 5.5.3.7. Most industry in the region is light industry which typically does not generate large amounts of air emissions. The "major" sources of air emissions in the region are sparsely scattered throughout the analysis area. In other words, there is not a concentrated area with a significant amount of industry. The light industries currently in the region or planning to locate in the region typically are not heavy industries that generate great amounts of air pollution.

**5.5.3.3.2 Army's Proposed Action.** Elements of the Army's Proposed Action which have resulted in direct and indirect effects to air quality include:

- new training which is to be conducted at FLW including flame field expedient deterrent training, firing of ammunition (including smoke pots and smoke grenades), BIDS training, NBC training, CDTF training, fog oil training, and driver training;
- use of miscellaneous class support materials;
- construction activities;
- increased utility use;
- increased support functions such as vehicle maintenance; and
- operation of vehicles on unpaved roads during training.

**Emission Sources.** A summary of the air emissions from full implementation of the Army's Proposed Action (including fog oil usage at 84,500 gallons per year with maximum daily use up to 1,200 gallons) is provided in Table 5.57. As shown in the table, fog oil training is a major contributor to the overall air emissions increase resulting from the Army's Proposed Action.

**Table 5.57:**
**Summary of Annual Air Quality Emissions from the Army's Proposed Action (tons per year)**

| Training/Emission Source | EIS Section Reference | NOx | SOx | PM-10 | VOC | CO |
|---|---|---|---|---|---|---|
| FFE Deterrent Train. | 5.2.2.3.1 | 0.19 | 0 | 6.25 | 8.05 | 13.01 |
| Firing of Ammunition (smoke pots/smoke grenades) | 5.2.2.3.2 | 0 | 0 | 5.81 | 0 | 0.24 |
| BIDS | 5.2.2.3.3 | 0 | 0 | 0.04 | 0.02 | 0 |
| NBC | 5.2.2.3.4 | 0 | 0 | 1.6 | 0.75 | 0 |
| New Simulants | 5.2.2.3.5 | 0 | 0 | 0 | 1.73 | 0 |
| CDTF | 5.2.2.3.6 | 33.5 | 6.9 | 1.0 | 1.4 | 13.3 |
| Fog Oil /Obscurant | 5.2.2.3.7 | 1.09 | 0.90 | 242.51 | 97.08 | 0.42 |
| Miscellaneous Class Support | 5.2.2.3.11 | 0 | 0 | 0 | 0.01 | 0 |
| Construction | 5.3.2.3.1 | 0 | 0 | Not quantified | 0 | 0 |
| Utilities | 5.3.2.3.2 | 6.75 | 10.6 | 0.61 | 0.25 | 1.56 |
| Vehicle Maintenance | 5.4.2.3.1 | 0 | 0 | < 0.05 | 3.1 | 0 |
| Unpaved Road Emissions During Training | 5.2.2.3 | 0 | 0 | 31 | 0 | 0 |
| Fuels Management | 5.4.2.3.2 | 0 | 0 | 0 | 0.24 | 0 |

*Note: All values are presented in tons per year (tpy)*

*Source: Harland Bartholomew & Associates, Inc*

**5.5.3.3.3 Dispersion modeling.** Dispersion modeling was conducted for PM-10 to determine cumulative ambient air quality impacts. Traditionally, impacts predicted by computer models are more conservative (i.e., more adverse) than actual impacts that occur based on ambient air monitoring conducted after operations are initiated because the computer models assume steady state conditions, no hills or vegetation, and no chemical transformation. Emission sources, background concentrations, and dispersion models used in this analysis were coordinated with both EPA and MDNR. Emission sources used in the model include the Army's Proposed Action sources and sources that are contained in MDNR's inventory for the FLW region (both of which are summarized above).

Analyses presented in subsection 5.2.2.3 document that full implementation of fog oil training at levels specified under the Army's Proposed Action (using up to 84,500 gallons per year and up to 1,200 gallons per day) will exceed NAAQS for PM-10. This conclusion is based on the highly conservative modelling that has been conducted to date, using best, currently available model input data. As a result of these findings, the Draft EIS stated that the Army would "mitigate" the Proposed Action by reducing fog oil consumption levels to those specified in the current fog oil air permit (65,000 annual and 3,700 pounds per day or approximately 481 gallons per day). The purpose of the cumulative dispersion modeling analysis conducted as part of this Final EIS is to verify that the Army can implement this mitigated level of fog oil training, in combination with past, present and reasonably foreseeable future actions, while complying with NAAQS.

The cumulative analysis assumes that impacts relating to the Army's Proposed Action (including fog oil training at mitigated level equal to current permit conditions) are added to the existing sources and existing background impacts. The existing and Army's Proposed Action sources (excluding the fog oil) were modeled using the same five years of meteorological data used for the existing permit. The fog oil training was modeled using the existing permitted meteorological conditions and incorporates fog oil emissions, smoke pots used in conjunction with fog oil training, exhaust emissions from the fog oil generators, and the unpaved road emissions from vehicles used during training.

Table 5.58 presents a comparison of the 24-hour and annual NAAQS standards for PM-10 with the 2nd highest high 24-hour and annual PM-10 emissions predicted in the modeling for the cumulative analysis that included: 1) existing sources; 2) Army's Proposed Action sources (CDTF, unpaved road emissions from driver training, FFE training, smoke grenades and smoke pots (not to be used in conjunction with fog oil training), new utilities, and fog oil training which is mitigated to the conditions and maximum annual and daily use levels specified in the current MDNR Air Permit #0695-010); and 3) background concentrations. It should be noted that for dispersion modeling it is assumed that all sources operate concurrently. A probability analysis indicates that the probability of the BRAC air emission sources operating simultaneously will occur less frequently than one in a million This indicates that actual PM-10 ambient air monitoring data will likely be much less than that predicted by the dispersion model. A detailed discussion of the cumulative impact modeling, related assumptions, and probability analysis has been provided in the *Air Quality Technical Reference Document: Relocation of the US Army Chemical School and US Army Military Police School to Fort Leonard Wood, Missouri* (COE KC, 1997a).

**Table 5.58:**
**Comparison of Predicted PM-10 Concentrations with 24-hour and Annual National Ambient Air Quality Standards for the Army's Proposed Action - With Fog Oil Training Levels Mitigated to Conditions Specified in the Existing Air Quality Permit**

| Modeling Run | Maximum 24-hr Predicted Concentrations | 24-hr NAAQS | Maximum Annual Predicted Concentrations | Annual NAAQS |
|---|---|---|---|---|
| 1987 | 144 | 150 | 30 | 50 |
| 1988 | 141 | 150 | 29 | 50 |
| 1989 | 139 | 150 | 31 | 50 |
| 1990 | 147 | 150 | 30 | 50 |
| 1991 | 141 | 150 | 29 | 50 |

Note:
1) All values are presented in ($\mu$g/m3)
2) Assumes fog oil training conducted at 3,700 pounds (approx. 481 gallons, PM-10 = 3,700 x 0.7 = 2,600 pounds ) per day for 135 days and a max. of 65,000 gallons per year which equal current permitted levels.
3) Assumes that smoke pots or smoke grenades will not be used in conjunction with fog oil training
4) Five years of meteorological data is used which is consistent with the analysis used in support of the current fog oil air permit.
5) Background concentrations are accounted for in the maximum predicted annual and daily ambient air impacts.

*Source: Harland Bartholomew & Associates, Inc*

The National Ambient Air Quality Standard (NAAQS) for a 24-hour period for PM-10 is 150 $\mu$g/m3. The highest predicted concentration based on the modeling for a 24-hour period was 147 $\mu$g/m3 using the 1990 meteorological data year. The NAAQS for an annual period for PM-10 is 50 $\mu$g/m3. The highest predicted annual concentrations was 31$\mu$g/m3 using the 1989 meteorological data. Based on the ambient air modeling conducted for the cumulative analysis, all ambient air concentrations from training under the Army's Proposed Action with the restrictions of the current air quality permit are within the National Ambient Air Quality Standards for PM-10.

**Monitoring.** To confirm that the predicted modeled data is consistent with actual emissions that occur when fog oil training is initiated, and to ensure compliance with the National Ambient Air Quality Standards, FLW will comply with any permit conditions requiring monitoring. A summary of monitoring programs is located in Appendix K of Volume III. It is the intent of the ambient air monitoring to monitor pollutant concentrations under actual meteorological and training conditions. Since the analysis conducted for the air dispersion modeling is conservative (i.e. it assumed all emission sources are operated concurrently, and does not account for terrain variations which tend to reduce concentrations), it is anticipated that the monitoring data will record concentrations that are much lower than those predicted by the model used to develop conclusions presented herein. The installation will also conduct at least two years of monitoring prior to the start of training for both PM-10 and ozone to establish baseline data. Monitoring points and a draft air quality monitoring plan have been developed in conjunction with MDNR. The monitoring locations are based on the highest predicted concentrations using the dispersion model or specific sites identified by MDNR. Monitoring results will be submitted quarterly to the MDNR Air Pollution Control Program. Per the terms of the existing permit, a Public Informational Meeting will be held to present the results of pre-startup monitoring.

**Ozone.** Indirect cumulative impacts associated with implementation of the Army's Proposed Action include the potential increase in ground level ozone as a result of increased VOC emissions, primarily due to fog oil training emissions. Air dispersion modeling from an individual location cannot accurately be performed to predict ambient air quality impacts from VOCs since ozone formation is based on regional air quality parameters (i.e. how much NOx is in the air), so the mechanism for ensuring NAAQS compliance is ambient air monitoring. Fort Leonard Wood will perform ozone ambient air monitoring as described in the Monitoring Plan Summary provided in Appendix K (Vol III of the EIS). The impacts are not anticipated to be significantly adverse due to the small amount of VOC and NOx sources in the FLW area and sources upwind of FLW (based on prevailing summertime wind direction).

**5.5.3.3.3 Conclusion (including Mitigation).** Review of this subsection (and prior air quality subsections of the EIS) indicate that full implementation of the Army's Proposed Action (as it relates to fog oil training at OPTM levels and all other proposed actions) will result in exceeding the NAAQS for 24-hour PM-10. The OPTM fog oil training includes the use of up to 84,500 gallons per year and up to 1,200 gallons per day of fog oil. Mitigation is thus required to comply with the NAAQS. This conclusion is based on current data sources and highly conservative modeling assumptions. Therefore, the cumulative impact analysis quantifies the level of mitigation (through reductions in the quantity of fog oil to be used or other sources) will be necessary to reduce PM-10 air quality impacts to acceptable levels.

**Results of Cumulative Air Analysis.** The cumulative air quality analysis evaluates implementation of the Army's Proposed Action (with fog oil training mitigated to conditions and use limits established by the current MDNR Air Permit #0695-010, not the OPTM training levels), in association with applicable past, present and reasonably foreseeable actions. The cumulative ambient air modeling demonstrates that all daily and annual ambient air concentrations resulting from implementation of the Army's Proposed Action (with mitigated fog oil training levels, not the OPTM training levels) are predicted to be within the National Ambient Air Quality Standards for PM-10 (see Table 5.58). Specifically, under this mitigated implementation plan to comply with NAAQS, the Army will: 1) limit fog oil usage to a maximum of 3,700 pounds (approximately 481 gallons) of fog oil per day and 65,000 gallons of fog oil per year; and 2) comply with all other conditions of the existing air quality permit (see Table 5.58). The process used to conduct this cumulative air analysis is further documented in the *Air Quality Technical Reference Document: Relocation of the US Army Chemical School and US Army Military Police School to Fort Leonard Wood, Missouri* (COE KC, 1997a).

**Required Modifications to Fog Oil Training Methods.** Currently, there are several Chemical School fog oil training course requirements that exceed the current permit limit of 3,700 pounds (approximately 481 gallons) per day. Until a revised permit is submitted by the Army and approved by MDNR, the Army will not fully implement the preferred fog oil training methods as described under the Army's Optimum Training Method in Volume IV of the EIS. Training methods which result in reduced annual and daily quantities of fog oil usage will be employed. These revised training methods will not achieve the training synergism expected from the relocation of the Chemical and Military Police schools to Fort Leonard Wood and these schools training with the Engineer School. This will not achieve the appropriate and desired level of training proficiency that would be developed through full implementation of the Army's Proposed Action training methods.

**Potential Revised Air Permit.** Because the implementation of fog oil training at the mitigated (existing permit) level does not provide the desired level of training as stated above, Fort Leonard Wood intends to pursue a revised air permit with MDNR after evaluating the assumptions used for the model as described in subsection 5.2.2.3.7. The revised permit application may request consideration of approval to use fog oil quantities up to the maximum levels specified under full implementation (non-mitigated) of the Army's Proposed Action (up to 84,500 gallons per year and up to 1,200 gallons per day). Any such permit renewal process will be subject to full public disclosure and comment per the conditions and procedures established by MDNR.

If reevaluating the modeling assumptions used for the current air permit and conducting additional modeling indicates that a daily increase in fog oil would consume more than the allowed PM-10 increment, then FLW may evaluate the potential to reduce other sources of PM-10 emissions in the area to add available increment for use in fog oil training. This process of reducing other particulate emissions to ensure overall air quality standards are met is commonly referred to as "offsets". The area contains several large charcoal kilns, rock crushers and other sources of PM-10 that potentially could be used for offsets. A detailed offset analysis is not required for the FEIS since compliance with the existing air permit will ensure compliance with the PSD increment and NAAQS as demonstrated by the analysis discussed above. Offsets may not be necessary and will not be analyzed until the assumptions used for the existing air permit are reevaluated. Any offset analysis that may be conducted would be performed using the guidelines provided by EPA (*New Source Review Workshop Manual - Draft)* and would be coordinated with both MDNR and EPA.

The air permitting process administered by MDNR provides a regulatory mechanism which incorporates special permit conditions into each air quality permit to ensure that National Ambient Air Quality Standards and PSD increment are being achieved. These permit conditions incorporate mitigation measures into the design and operation of the permitted facilities. The permit conditions restrict activities in a manner that reduces the potential impacts to the environment consistent with the overall air quality of the region where the permit is issued. The PSD permit terms and conditions are federally enforceable.

It is not anticipated that revision of the air quality permit up to the limits defined under the Army's Proposed Action would require additional NEPA analysis since all other sections of this EIS (including evaluation of potential impacts to human health and federally-listed threatened and endangered species) have evaluated and disclosed impacts (and associated mitigation actions other than reductions in the quantities of fog oil to be used) based on the assumption of full implementation of the Army's Proposed Action.

**Ongoing Compliance Program.** Fort Leonard Wood will continue their on-going air quality compliance program with all applicable Federal, state, and local permits and regulations including compliance with the PSD permitting process and submission of their annual air emissions inventory questionnaire (EIQ). Fort Leonard Wood is required to submit an annual EIQ which will reflect the Proposed Action once activities have actually been relocated. It is anticipated that MDNR will continue to conduct their annual compliance audits at FLW. In addition, all BRAC actions that have air emissions, including Missouri air permitting de minimis sources, will be evaluated during the Title V permit process.

**Consumption of PSD Increment.** The fog oil training defined by the existing air permit results in a daily quantity which consumes the entire 24 hour PM-10 PSD increment at the installation boundary. However,

due to the fact that air dispersion continues to occur beyond the installation boundary, fog oil training will consume less than 30 $\mu$g/m3 (PSD increment) for receptors beyond the boundary.

New air emission sources (such as an industrial plant) that are planning to move into the region may be required to obtain an air quality permit, such as a PSD permit, depending on the quantity of emissions they expect to generate. Since an effective date for PSD increment consumption has been established for the FLW area, and fog oil training has been included in MDNR's inventory, the fog oil training would be required to be included in any future modeling, review, and permitting that occurs in the region. Each individual new source would be responsible for demonstrating compliance with air quality standards during the permit review and any new PM-10 increment consuming source must demonstrate compliance with the PM-10 increment. The PSD increment is fixed regardless of the type or quantity of sources. Fog oil training will not have any foreseeable impact on future activities or growth in the area for new businesses that would have non-particulate air emissions. Receptors further from the boundary have more increment available, thus for a new business or industry that would emit particulate matter, the farther the source is located from FLW boundaries, the less any potential limit. The greatest amount of increment consumed by the fog oil is on the FLW boundary, thus any new business or industry that would emit particulate matter may be limited if the location is close to FLW boundaries.

### 5.5.3.4 Noise

**5.5.3.4.1 Introduction.** The cumulative effects of noise associated with the Proposed Action are defined by consideration of the day-night sound level (DNL). As discussed in subsection 4.4.3 the DNL is used in the identification of noise zones and to identify compatible future uses within these zones. Noise zones are classified into one of three levels: Zone 1 areas are defined as areas where the DNL is less than 65 decibels, A-weighted scale (dBA); Zone II areas are defined as areas where the DNL is between 65 and 75 dBA DNL; and Zone III areas are defined as areas where the DNL is greater than 75 dBA DNL. Cumulative impacts would be significant if they expanded the existing Zone II or Zone III areas that extend beyond the installation boundary, or result in the extension of the on-post Zone II or Zone III areas in a manner that the noise would impact existing or proposed sensitive (Zone I) receptors.

**5.5.3.4.1.1 Analysis Area.** The analysis area for cumulative noise impacts includes the installation boundary and those noise zone II and III areas that extend beyond the installation boundary. These areas include approximately 133 acres in unincorporated Pulaski County on the southeast boundary of the installation and approximately 5 acres adjacent to the southwest quadrant of the installation, north of the Cannon Range. Figure 4.3 provides an illustration of the existing noise zones at FLW.

**5.5.3.4.1.2 Past and Present Actions.** Past and present actions which have resulted in, or have the potential to result in, direct and indirect noise effects include:

- Programs of Instruction as discussed in subsection 5.5.2.1.1 which include interior training such as classroom instruction and the use of computer simulation; and exterior instruction which includes the use of bivouac sites, training areas, computer simulation, live-fire weapons, explosives and smoke grenades, and on- and off-road vehicle use;
- Aircraft operations in and near Forney Army Airfield and adjacent to the southwest quadrant of the installation, on Cannon Range;
- Construction, maintenance and operations activities associated with on- and off-post infrastructure maintenance and improvement;
- Ongoing daily activities as listed in subsections 5.5.2.1.1 and 5.5.2.1.2 such as aircraft operations, vehicular traffic, facility and equipment maintenance, ordnance demolition, the use of large and small caliber weapons firing ranges, recreational activities, agricultural activities, and other related activities; and
- Continued coordination between the installation and the Regional Commerce and Growth Association in Pulaski County and the cities of Crocker, Dixon, Richland, Waynesville, and St Robert which is intended to help eliminate or reduce the potential for conflicts between on-post and off-post activities as part of the ICUZ and other management programs.

**5.5.3.4.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered for direct and indirect effects in the cumulative impacts analysis include the continuation of past and present actions, as discussed above. Modifications and expansions to the continuation of past and present actions which have the potential to result in cumulative effects include the expansion of aircraft operations in and near Forney Army Airfield as a jointly operated civilian-military airfield as discussed in subsection 5.2.2.4.1.1.

**5.5.3.4.2 Army's Proposed Action.** Elements of the proposed action which have resulted in direct and indirect effects to noise include:

- Expansion of the amount of exterior training, including the amount of ammunition, grenades, and explosives that will be used;
- Expansion of aircraft operations in and near Forney Army Airfield; and
- Noise associated with the construction of BRAC related construction projects.

**5.5.3.4.3 Conclusion (including Mitigation).** Activities located within the designated noise cumulative impact area are limited to those summarized above, all of which have been considered in previous subsections of the text. No other activities are known to exist or be planned for implementation within the cumulative impact analysis area that have the potential to increase noise levels. Therefore, it is anticipated that implementation of the proposed action in association with past, present and reasonably foreseeable future actions will not significantly degrade the existing noise environment, and is unlikely to result in the generation of additional noise complaints. Consequently, no mitigation is necessary. Continued coordination between the installation and the Regional Commerce and Growth Association in Pulaski County and adjacent cities will help to ensure that noise sensitive land uses are avoided in those limited off-post areas that are exposed to adverse noise levels.

**5.5.3.5 Water Resources**

**5.5.3.5.A Surface Waters and Floodplains.**

**5.5.3.5.A.1 Introduction.** Adverse impacts to floodplains within or beyond the installation boundaries are not expected to occur since all proposed BRAC actions, present actions within FLW boundaries, and reasonably foreseeable future actions at FLW will be implemented in compliance with Executive Order 11988 and 11990 which require the regulatory floodway be kept free of encroachments to eliminate increased activities in the 100-year flood elevation. Therefore, regulatory floodplain impacts will not be considered further in this subsection. The following discussion focuses on the potential for cumulative impacts relating to surface water resources. Criteria for identification of significant adverse impact to surface water are based on compliance with applicable Federal and state regulations. Any action or combination of actions that are expected to result in the inability to meet these permits and regulations would be considered to be significantly adverse.

**5.5.3.5.A.1.1 Analysis Area.** As described in Section 4 (Affected Environment) surface waters within the installation boundary demonstrate good water quality, and benthic invertebrate samples taken from the Big Piney River and Roubidoux Creek were indicative of good water quality. These factors support the conclusion that the cumulative effects of past activities upstream from the installation, in association with the installations ongoing activities has had no significant adverse impact to surface waters. As stated in prior subsections of this impact analysis, some elements of the proposed BRAC action have the potential to result in minor adverse impacts to surface water quality. However, implementation of best management practices and other protective measures as described in prior subsections are expected to reduce these impacts to non-detectable limits at the installation boundaries. Therefore, the analysis area for the cumulative effects analysis for surface water is defined by the installation boundary.

**5.5.3.5.A.1.2 Past and Present Actions.** Past and present actions, discussed in subsection 5.5.2.1, which have resulted in, or have the potential to result in, direct and indirect effects on surface waters include:

- sediment and contaminants in surface waters as a result of the ongoing mission at FLW including training operations and clearing and/or development in support of the FLW mission;
- activities in that portion of the Mark Twain National Forest that is located within FLW boundaries, including timber management and operations, may result in soil displacement and subsequently lead to erosion and an increased sediment load in surface waters;
- construction activities associated with installation roadways, housing or other facilities may temporarily increase the levels of sediment, contaminants and construction debris in surface waters;
- on going natural resource programs include the establishment and maintenance of wildlife water units and sedimentation basins which will reduce the potential for impacts to surface waters; and
- the use of BMPs and other environmental controls during training and construction as described in subsections 5.1.4 and 5.3.2.5.A will reduce the potential for impacts to surface waters.

**5.5.3.5.A.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered in the cumulative analysis include the continuation of past and present actions within FLW boundaries, as discussed above; implementation of the non-BRAC construction projects and ongoing Natural Resources/Forestry Management programs at FLW as summarized in subsection 5.5.2.2. In addition, FLW will continue to implement and expand the Land Rehabilitation and Management program to minimize surface water impacts including the construction of sediment control basins when necessary.

**5.5.3.5.A.2 Army's Proposed Action.** Elements of the Proposed Action discussed in subsection 5.2.2.5.A which will result in direct and indirect effects to surface water quality include:

- vehicle operations on training and maneuver areas;
- in-stream or in-lake vehicle operations;
- potential accidental spills of fog oil;
- release of unburned fuels from FFE deterrent training; and
- implementation of the planned construction packages as discussed in subsection 5.3.2.5.A.

**5.5.3.5.A.3 Conclusion (including Mitigation).** After reviewing the direct and indirect effects on surface waters of the past and present, reasonably foreseeable future actions and the Army's Proposed Action it is anticipated that there may be minor adverse cumulative impacts to surface waters within FLW boundaries. However, planned mitigation measures are expected to ensure that cumulative impacts within installation boundaries do not reach significant levels, and there are adequate buffer lands between construction and training areas and the installation boundaries to ensure that water quality downstream of the boundaries is not adversely impacted. The basis for this conclusion is described below.

As discussed in subsection 5.3.2.5.A, all construction projects (BRAC and non-BRAC) will include construction BMPs and long-term construction features to ensure compliance with Federal and state water quality permits and regulations, including Missouri Clean Water Commission requirements. These BMPs and environmental controls are required to minimize soil erosion and protect surface waters. Therefore, the potential for minor adverse cumulative impacts will be reduced.

Although there will be a potential for fog oil to enter surface waters through accidental spills, adverse effects will be minimal due to the small amounts likely to enter surface waters and the controls established in the Installation Spill Prevention and Response Plan (Radian, 1994).

Past and present training operations at FLW have included vehicle in-stream crossings at unimproved areas, and resulted in the redistribution of sediment and destruction of stream banks. To avoid many of the impacts associated with in-stream vehicle crossings, FLW has implemented management controls to limit stream crossings to only improved locations as discussed in subsection 5.1.4.2. All of the new stream crossings will be improved with the exception of one crossing at Roubidoux Creek for the Mobile Smoke Training Area which will have an unimproved crossing that will only be accessible in low flow conditions. Minor direct adverse impacts to surface waters will be realized from in-stream vehicle operations, however these impacts will be localized and minor. Minor adverse cumulative impacts are not

anticipated for those activities conducted within a surface water body previously designed and constructed for the use of vehicle in-lake operations.

Minor adverse impacts to surface waters will continue as a result of training, however FLW implements environmental controls to minimize erosion and protect surface waters during training as described in subsection 5.1.4. Sedimentation basins currently exist at several training areas to contain and minimize sediment runoff. Within the proposed action, sedimentation basin locations have been identified and will be designed into the initial project for Range Modifications (Project 46094). Through the use of mitigation measures, the cumulative adverse impacts to surface waters from the ongoing and future mission will be minimal.

To reduce sediment runoff resulting from timber management and operations within Mark Twain National Forest lands within FLW boundaries (and elsewhere), the USFS and FLW utilize measures that include providing adequate buffer and filter strips to filter sediment prior to reaching a surface water.

### 5.5.3.5.B Hydrogeology/Groundwater

**5.5.3.5.B.1 Introduction.** The following discussion focuses on the potential for cumulative impacts relating to groundwater resources. Since it is known that water entering the groundwater system within FLW boundaries flows back to the surface from several springs (see following subsection) the criteria for identification of significant adverse impact to groundwater are based on the ability of spring discharges to comply with applicable Federal and state regulations. Any action or combination of actions that are expected to result in the inability to meet these permits and regulations would be considered to be significantly adverse.

**5.5.3.5.B.1.1 Analysis Area.** The analysis area for cumulative impacts to ground water includes all lands within the boundaries of the FLW, plus Roubidoux spring, Shanghai spring and Miller spring. This analysis area is based on the results of previous investigations (discussed in subsection 4.5.3) that indicate that water entering the groundwater system on the FLW reservation discharges to Roubidoux spring located north-northwest of FLW, Shanghai spring located north-northeast of FLW, Miller spring located east of FLW or to other springs located within FLW boundaries.

**5.5.3.5.B.1.2 Past and Present Actions.** Past and present actions which have resulted in direct and indirect effects on ground water include:

- Operation of the FLW wastewater treatment plant has resulted in discharge of treated wastewater to Dry Creek, which in some flow conditions is lost to ground water as Dry Creek is a loosing stream that discharges to Shanghai Spring;
- Portions of the run off from roadways and parking lots that could contain traces of petroleum, oils and grease may enter the ground water system through sinkholes in the vicinity of the cantonment area;
- Natural resources and forestry management on USFS lands near Roubidoux spring, Shanghai spring and Miller spring could cause short term impacts to the turbidity of the springs due to sedimentation during timber harvesting.
- Operation of landfills, now ceased at FLW, at the installation may have resulted in releases of contaminants to ground water;
- Fuels and other materials stored in underground storage tanks, which are now regulated and regularly tested, may have been released to ground water; and
- Development of a sinkhole in a sedimentation basin allowed sediment from ongoing training operations at FLW to enter the ground water system and discharge at Shanghai spring. The sinkhole was backfilled and capped with clay to eliminate the discharge to ground water.

**5.5.3.5.B.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered for direct and indirect effects in the cumulative impact analysis include:

- Continued natural resource and forestry management on USFS lands within and beyond FLW boundaries; and ongoing management plans prepared and implemented by FLW:
- Continued operation and management of FLW training and support missions; and
- Completion of the non-BRAC construction projects.

**5.5.3.5.B.2 Army's Proposed Action.** Elements of the Army's Proposed Action which could result in direct and indirect effects to ground water include:

- Soil erosion resulting from training activities at training and maneuver areas;
- Release of unburned fuels during FFE deterrent training;
- Maintenance training and operations; and
- Soil erosion from construction of facilities.

**5.5.3.5.B.3 Conclusion (including Mitigation).** After reviewing the direct and indirect effects of the past and present actions, the reasonably foreseeable future activities and the Army's Proposed Action on ground water, it is concluded that there is a potential for minor indirect adverse impacts to occur from sediment-laden surface water flowing into karst features within installation boundaries. The basis for this conclusion is described below.

The use of soil erosion management practices at construction sites will reduce the amount of sediment leaving the construction area. Restrictions on the location and timing of training and maneuver activities will reduce erosion from the training areas. The use of sedimentation basins will further reduce the potential for sediments to impact ground water. Most of the training areas are in the southern portion of FLW which has fewer sinkholes and thus there is less opportunity for an impact to ground water.

At the FFE deterrent training site, a geosynthetic impermeable liner will be installed beneath the soil to capture any water which infiltrates through the soil. This will protect ground water from potential impacts from unburned fuel.

The potential for an indirect impact to ground water from releases of oils, greases or other fluids used in maintenance and training operations is minimal due to the relatively small quantity of fluids that could be released at any uncontrolled location, the small area involved relative to the entire surface and groundwater resource areas, the assumption that all training will be conducted in accordance with approved operating procedures, and the use of the Installation Spill Prevention and Response Plan (Radian, 1994) to minimize the adverse impact of any spill that may occur.

### 5.5.3.6 Geology and Soils

**5.5.3.6.1 Introduction.** Evaluation criteria for consideration of impacts to geologic features and soils are based on chemical constituent concentrations in the soil (relative to applicable laws and regulations) and on physical damage to soil and geologic features. For the purpose of this analysis, a cumulative effect that results in soil containing concentrations of chemicals above applicable regulatory standards over more than a local area would be considered to be a significant adverse impact. Physical damage to soil and geologic features is less quantifiable, and significance levels are based upon professional judgement .

**5.5.3.6.1.1 Analysis Area.** The analysis area for cumulative impacts to geology and soil is the boundary of the FLW reservation. This analysis area was selected because activities within the boundaries of the installation are not expected to have an impact on geologic features or to soils outside of the FLW boundaries.

**5.5.3.6.1.2 Past and Present Actions.** Past and present actions which have resulted in, or have the potential to result in, direct and indirect effects on soils and geology include:

- Construction and maintenance of roadways, buildings and facilities;
- Construction and operation of training areas and ranges; and
- Releases of petroleum, oil and lubricants from maintenance and storage areas.

**5.5.3.6.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered for direct and indirect effects in the cumulative impacts analysis included the continuation of past and present management and operational actions, and construction of the facilities summarized in subsection .5.5.2.1.

**5.5.3.6.2 Army's Proposed Action.** Elements of the Proposed Action which are expected to result in direct and indirect effects to geology and soil include:

- Soil erosion resulting from training activities at training and maneuver areas;
- Release of unburned fuels during FFE deterrents training:
- Deposition of fog oil obscurant;
- Maintenance training and operations; and
- Soil erosion from construction of facilities.

**5.5.3.6.3 Conclusion (including Mitigation).** After reviewing the direct and indirect effects on soils and geology of the past and present, reasonably foreseeable future actions and the Army's Proposed Action it is anticipated that there may be minor adverse cumulative impacts to soils and geology. Through the use of mitigation measures, cumulative impacts to soils and geology will not be significant. These impacts include adverse impacts to soil as a result of erosion; and the potential for impacts as a result of accumulation of hydrocarbons from FFE deterrent training and maintenance training and operations to soil within the various designated training areas.

The rate of soil erosion will be reduced through implementation of best management practices during construction continued implementation of the FLW Integrated Training Area Management Plan. Impacts from the build up of hydrocarbons as a result of FFE deterrent training will be reduced by using techniques to reduce the quantity of unburned fuels that are released and by containing, and treating where necessary, soils that are impacted by the build up of unburned hydrocarbons. In consideration of these mitigation actions, the cumulative impact of these actions is not anticipated to be significant.

### 5.5.3.7 Infrastructure

**5.5.3.7.1 Introduction.** The significance of cumulative effects on infrastructure associated with implementing the Army's Proposed Action are defined by the whether the infrastructure has sufficient capacity and can safely handle total demand without adversely affecting the environment, or unacceptable deterioration of the supply or treatment system.

For the potable water and wastewater system, significance evaluation criteria are defined by applicable permits and regulations. As discussed in subsection 4.10.2.3, the drinking water systems at FLW must satisfy the requirements of the Safe Drinking Water Act (SDWA), AR 200-1, AR 420-46, AR40-5, and their MDNR Permit of Approval Number 3079500. As discussed in subsection 4.10.2.1, the FLW wastewater treatment plant must maintain compliance with the Missouri Clean Water Law and the Federal Water Pollution Control Act, and satisfy the requirements of their MDNR Discharge Permit No. MO-0029742. The evaluation criteria for storm water discharge is compliance with the MDNR NPDES Permit No. MO-0117251.

For contracted utility components and contracted solid waste disposal, the evaluation criteria is whether capacities of the systems are exceeded. If not, it is then the responsibility of the utility supplier to assure operations are accomplished in accordance with appropriate regulations and permits. The evaluation of transportation systems considers whether design capacities will be exceeded and whether standards established by the US DOT and Missouri DOT have been met.

**5.5.3.7.1.1 Analysis Area.** The analysis area for the utility systems is the installation boundary. This is due to the confines of the water, wastewater, and stormwater systems being limited to FLW, and since the contracted utility components will be analyzed from the service connection located on FLW. Since the majority of traffic origins and destinations at FLW are within Pulaski County, the analysis area for the transportation systems is defined to include all of Pulaski County.

**5.5.3.7.1.2 Past and Present Actions.** Past and present actions which have resulted in, or have the potential to result in, direct and indirect effects on infrastructure include the following.

- Fort Leonard Wood treats and distributes water from the Big Piney River as described in subsection 4.7.1.1 and treats its sewage before discharging the treated effluent to a tributary of the Big Piney River as described in subsection 4.7.1.2. When managed in accordance with their existing operating permits, no detrimental effect on the environment are expected to occur.
- Energy and communication demands have resulted in commercial suppliers providing FLW with necessary electrical, natural gas, and telephone service as described in subsections 4.7.1.4 and 4.7.1.5. Expanded use of natural gas as a heating source has the potential to reduce impacts to the environment when compared with past practices of using heating oil.
- Fort Leonard Wood no longer disposes of solid waste on-post and instead contracts for disposal of all solid waste at landfills located off-post as described in subsection 4.7.2. Proper closure and post-closure care of past landfills on FLW should ensure that existing landfills do not adversely effect the environment. Programs to encourage recycling and solid waste reduction reduce the amount of waste being disposed at off-post landfills.
- Airfields, railroads, roadways and traffic control devices on and around FLW have been improved and maintained to facilitate traffic movement as described in subsection 4.7.3.1. The increase in vehicular movements may adversely impact traffic congestion. Maintaining and improving the infrastructure for transportation should serve to minimize any negative impact to the environment.

**5.5.3.7.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered for direct and indirect effects in the cumulative impacts analysis included the continuation of past and present actions as described in subsection discussed above. Modifications and expansions to past and present actions which have the potential to result in cumulative effects include the following:

- expansion of the natural gas distribution to additional existing and planned facilities thereby reducing the number of individual package heating plants;
- continued efforts to reduce solid wastes disposed in off-post landfills to 50-percent of the FY 1992 solid waste disposal levels by the year 2000;
- improvements to Highway 17 to facilitate Army mobilization requirements to the north; and
- establishment of a civilian Fixed Based Operator and joint civilian/military use of Forney AAF.

**5.5.3.7.2 Army's Proposed Action.** Elements of the proposed action which have the potential to result in direct and indirect effects to infrastructure include:

- activities that increase the effective population on FLW requiring increased utility service and increased energy consumption;
- activities that require significant extension of distribution lines and service connections to provide utilities required to support new facilities;
- activities that increase the volume of traffic to and from FLW as well as on the installation; and
- planned construction projects that improve the flow of traffic on FLW.

**5.5.3.7.3 Conclusion (including Mitigation).** An increase in traffic volume and delays is anticipated as a result of the BRAC action and all other cumulative actions described above. However, the degree of impact is not anticipated to be significant. The impacts of potential congestion problems will be reduced due to improvements included in the construction projects for the proposed Combined Headquarters and Instruction facility plan. Locating the Military Police School and Chemical School Instruction and Administration facility and the Unaccompanied Personnel Housing in the same vicinity as the existing Engineer School will reduce the number and frequency of potential vehicles traveling across the cantonment area. Improvements at the intersections of Nebraska Avenue at First Street and Gate Street at Missouri Avenue will help accommodate the added traffic volume to the area around Lincoln Hall. Realignment of Nebraska Avenue and improving Gate Street will also help offset the increased traffic volume traveling to and from this area. Additional improvements to striping and signalization at numerous intersections as recommended in MTMCTEA Report INH 95-23 *BRAC Impact Analysis of Military Police*

*and Chemical Schools Realignment* (MTMC, 1996), will also serve to reduce the impact of the added traffic volume at FLW.

Assuming that currently planned improvements relating to utility system distribution and collection systems are completed as scheduled, and in consideration of the fact that existing treatment and plant facilities have adequate capacity to serve all current and reasonably foreseeable future needs, no significant adverse impacts are expected to occur. Energy, communication systems, and solid waste disposal provided by outside sources will be adjusted by the supplier to meet the increased demand without impacting the environment. Energy consumption at FLW will increase but energy efficient facility construction and continued expansion of the natural gas system should help reduce the environmental impact of energy usage.

### 5.5.3.8 Hazardous and Toxic Materials

**5.5.3.8.1 Introduction.** Impacts relating to the handling, management, transportation and disposal of hazardous and toxic materials are not considered to be significant if these actions are conducted in full compliance with the Resource Conservation and Recovery Act (RCRA) of 1976, the Missouri Hazardous Waste Management Law (MDNR, 1986a and 1986b) as amended, Army Regulations (AR) 420-47, AR 420-76, AR 200-1, and all other applicable Federal, state and local regulations. The cumulative effects on Hazardous and Toxic Materials are defined by the relative magnitude of personnel and fiscal resources required to manage receipt, storage, use, collection, and disposal of the materials.

**5.5.3.8.1.1 Analysis Area.** The cumulative impact analysis area for this resource category includes all areas within the boundaries of FLW since the Army has direct control over operations within the installation boundaries, and is responsible for all actions conducted at FLW. Pertinent sections of the EIS discuss the fact that FLW uses licensed contractors to dispose of used hazardous and toxic materials. These contractors are responsible for handling, transporting and disposing of such materials in accordance with all applicable laws and regulations.

**5.5.3.8.1.2 Past and Present Actions.** Past and present actions which have resulted in, or have the potential to result in, direct and indirect effects associated with hazardous and toxic materials include the following.

- The types of hazardous wastes currently generated at FLW are shown in Tables 4.12 and 4.13. A release of any of these materials could impact the environment. To reduce the potential for a release into the environment and to minimize the damage should a release occur, FLW has implemented numerous programs as described in subsection 4.8 to manage the handling and disposal of hazardous materials and wastes and respond to releases should they occur.
- Past practices at FLW have resulted in sites at FLW that have the potential for adverse environmental impact. The Installation Action Plan (IAP) (FLW, 1996j) initially identified 68 potentially hazardous sites requiring investigation. Further studies have indicated that 57 of these sites require no further action. Investigations continue at the remaining sites as described in subsection 4.8.1.
- Regulated medical waste have been generated at the FLW Community Hospital. To ensure that these wastes do not impact the environment, the hospital's office of Safety Management manages the proper handling, transport and disposal of regulated medical wastes as described in subsection 4.8.9.
- Low-level radioactive materials have been used at FLW and related wastes periodically require disposal. The FLW Radiation Protection Office and the Industrial Operations Command ensure that the environment is not adversely impacted by implementing programs for the handling, packaging, transport, accumulation and disposal of low-level radioactive wastes as described in subsection 4.8.8.

**5.5.3.8.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered in the cumulative impact analysis include the continuation of present actions, as

described in subsection above. Modifications and expansions to the continuation of present actions which have the potential to result in cumulative effects include the following:

- Ongoing implementation of programs such as the Hazardous Waste Minimization Program and the Pollution Prevention Plan to reduce the hazardous materials and wastes at FLW; and
- investigation and possible remediation of the 11 SWMU sites requiring further investigation as indicated in the IAP.

**5.5.3.8.2 Army's Proposed Action.** Elements of the proposed action that will result in direct and indirect effects to hazardous and toxic materials include:

- all activities that increase the type and quantities of hazardous materials, radioactive materials, regulated medical wastes, and fuels used, handled, and stored at FLW; and
- the addition of training activities requiring the use of toxic agents and the disposal of their decontaminated by-products as special wastes;
- all activities that increase vehicle maintenance activities; and
- expedient mine training that may result in unburned fuels being released into the environment.

**5.5.3.8.3 Conclusion (including Mitigation).** Without the addition of proposed BRAC activities, continuation of existing environmental management programs (such as the Hazardous Waste Minimization Program, the Pollution Prevention Plan and the Hazardous Waste Management Plan) are expected to result in a reduction in the amount of hazardous materials used and disposed of by FLW. Addition of the BRAC activities at FLW will increase hazardous materials used, handled, stored and transported on FLW over current levels. This increase in hazardous materials will also result in an increase in the amount of hazardous and special wastes being removed from FLW for disposal of through properly licensed and monitored contract operations.

Continued compliance with all Federal, state and local permits and regulations after the relocation of the Military Police and Chemical Schools will result in an increased workload for the Environmental Division of the DPW. This increased workload will be associated with implementing hazardous material management plans and associated monitoring, record keeping and reporting. Additional fiscal resources will be required and programmed within the normal operations at FLW. These resources will be planned and programmed within the normal structure of operations at FLW. Based on consideration of all past and present, reasonably foreseeable future actions and the Army's Proposed Action it is anticipated that all hazardous and toxic materials, low-level radioactive materials, regulated medical wastes, fuels, and special wastes will be handled, stored, transported and disposed of in a manner which protects the environment and human health. No significant adverse impacts are anticipated, and no mitigation is required.

### 5.5.3.9 Munitions

As discussed in subsections 5.2.2.9, 5.3.2.9, and 5.4.2.9 implementation of the Army's Proposed Action at FLW will result in an increase in the type and quantity of live munitions, obscurants and signals used at FLW. No direct or indirect impacts to munitions storage and operational controls are expected to occur as a result of the increase in types and quantities of munitions used at FLW. Because there are no impacts under this category, there will be no cumulative impacts.

### 5.5.3.10 Permits and Regulatory Authority

**5.5.3.10.1 Introduction.** Implementation of the Army's Proposed Action will result in the requirement for additional construction and operating permits. The cumulative effects on permits and regulatory authority are defined by the relative magnitude of personnel and fiscal resources required to apply for and manage any required permits.

**5.5.3.10.1.1 Analysis Area.** Specific permit procedures and requirements serve to define the boundary of areas considered.

**5.5.3.10.1.2 Past and Present Actions.** Past and present actions which have resulted in, or have the potential to result in the need to obtain permits and regulatory authority include the following:

- Fort Leonard Wood has obtained required permits for existing air emission sources on the installation, as well as a permit to conduct fog oil training. Table 4.15 lists the currently permitted sources, their location and permit numbers.
- In compliance with the Missouri Clean Water Law and the Federal Water Pollution Control Act, MDNR has issued FLW an Authorization To Discharge Permit No. MO-0029742 for the wastewater plant that discharges to tributaries of Dry Fork (Big Piney River basin).
- In compliance with the Missouri Clean Water Law and the Federal Water Pollution Control Act, MDNR has issued FLW Missouri State Operating Permit No. MO-0117251 for storm water discharges to tributaries of Roubidoux Creek and Big Piney River.
- In compliance with MDNR regulations, FLW holds Permit of Approval No. 3079500 for a community water supply to dispense water to the public.

**5.5.3.10.1.3 Reasonably Foreseeable Future Actions.** The following reasonably foreseeable future actions have been identified through installation contacts, document review and the additional coordination actions described in subsection 5.5.1.

- Title V of the CAAA established a new Federal operating permit program for all "major" stationary air pollution sources. The next air quality permit that the installation will need to obtain is the Title V operating permit. An inventory of sources has been completed in preparation for this permit.
- Fort Leonard Wood has closed the last of its operating landfills, and in compliance with RCRA, is anticipating receipt of a Closure Permit.

**5.5.3.10.2 Army's Proposed Action.** Elements of the Army's Proposed Action that will require permits and regulatory authority include:

- All proposed actions that result in stationary source air emissions (including those with air permit de minimis emissions described in subsection 5.2.2.3) will be addressed during the Title V permit process and evaluated for inclusion, including fog oil usage and operation of the CDTF;
- Some of the activities and equipment associated with the implementation of the BRAC training objectives require FLW to obtain water quality management permits. Most construction will be greater than 5 acres (2 hectares), requiring application for inclusion in the state general stormwater permit.; and
- Activities and equipment associated with the BRAC training goals require FLW to obtain a Nuclear Regulatory Commission (NRC) license for radioactive material management. The Health Physics Office will be responsible for managing the NRC license.

**5.5.3.10.3 Conclusion (including Mitigation).** Fort Leonard Wood will continue to comply with all Federal, state and local regulations. As a result, it operates within all permit conditions and maintains ongoing coordination with appropriate regulatory agencies. To ensure that permit renewal applications, monitoring requirements and other documentation are completed in full compliance with requirements, FLW employs personnel in the Environment, Energy and Natural Resources Division, Directorate of Public Works in which a primarly function is regulatory compliance and permit actions..

The relocation of the Military Police and Chemical Schools will increase the number of permit applications and amount of compliance monitoring. This increase is associated with the functions of the schools and the activities being trained. The increase in permit activity will require programming of additional fiscal resources to prepare and manage all required permits. These permit activities will help ensure that significant adverse impacts to the environment do not occur. Other than the preparation and maintenance of the permits themselves, no mitigation is required under this evaluation category.

### 5.5.3.11 Biological Resources

### 5.5.3.11.A Threatened and Endangered Species

**5.5.3.11.A.1 Introduction.** This subsection addresses the cumulative effect of the Army's Proposed Action and past, present, and reasonably foreseeable future actions on federally endangered Indiana bats and gray bats and the federally threatened bald eagle.

Sound levels generated within the analysis area may disturb threatened and endangered (T & E) species, causing them to abandon otherwise suitable areas. Use of pesticides, herbicides, training materials, and other chemicals within the analysis area may generate toxicant levels that negatively affect T & E species. Forest clearing within the analysis area may kill individuals or remove habitat used by T & E species.

Monitoring has shown changes in numbers of individuals within and near the analysis area. The number of wintering Indiana bats have declined 87 percent in Missouri since the 1970s (USFWS, 1997). Indiana bat populations in most FLW caves are declining more rapidly than state population losses (USFWS, 1997). The population of gray bats inhabiting the FLW area has been characterized as "stable to increasing" (MDC, 1992). Annual surveys indicate the number of wintering bald eagles in Pulaski county is increasing and the number of wintering bald eagles observed inside FLW boundaries has remained static since 1988. To evaluate potential future effects to T & E species, FLW will monitor populations of Indiana bats, gray bats, and bald eagles for five years after initiation of the proposed action.

To assess cumulative effects, we evaluate whether direct and indirect effects of the proposed action, in combination with past, present, and reasonably foreseeable future actions result in the following:

- activities likely to generate adverse sound levels in the analysis area;
- activities likely to generate unsafe concentrations of toxicants in the analysis area; and
- decrease in number of acres of mature hardwood forest in the analysis area.

The USFWS issued a Biological Opinion (BO) on the BRAC action on 4 February, 1997 (USFWS, 1997). The BO concluded that the direct and indirect cumulative effects of relocating the Chemical School and Military Police School to FLW are not likely to jeopardize the continued existence of the Indiana bat, gray bat, or bald eagle. No critical habitat has been designated for these species in the action area, therefore none will be affected.

Non-discretionary term and conditions that allow exemption from Section 9 of the Endangered Species Act were issued with the BRAC BO (USFWS, 1997). The terms and conditions implement reasonable and prudent measures (RPMs) that minimize take of Indiana bats, gray bats, and bald eagles. In compliance with the RPMs, FLW will implement a biomonitoring plan that includes sampling biotic media (tissue of non-endangered bats, bat guano, non-endangered migratory birds, fish, and aquatic sediment) for presence or absence of fog oil and harmful breakdown products of fog oil. Monitoring of fog oil and TPA in biotic media will be conducted for a minimum of five field seasons after initial deployment of fog oil and TPA. Fort Leonard Wood will monitor populations of Indiana bats and gray bats for a minimum of five years after initiation of the action; bald eagles will be monitored for a minimum of three winters after the proposed action begins.

In addition to biomonitoring, FLW will comply with RPMs by verifying that use of colored smoke grenades does not pose significant risks to T & E species. To minimize take of T & E species, FLW will comply with RPMs that restrict time and location of use of fog oil, TPA smoke pots and grenades, and removal of suitable Indiana bat roost trees.

Fort Leonard Wood will continue project design features that protect Indiana bats and gray bats. In cooperation with MDC, FLW has established management guidelines for Indiana bats and gray bats on the installation. Protection zones, land use restrictions related to training and other installation activities, and timber management practices have been designated for important Indiana bat and gray bat habitat. Fort Leonard Wood is investigating the benefits of installing gates at hibernacula.

Implementation of discretionary conservation measures and RPMs issued with the Ongoing Mission BO (USFWS, 1996) and BRAC BO (USFWS, 1997) will reduce effects of the proposed action to T & E species. Analysis of cumulative effects of the proposed action included consideration of management practices that will be implemented in compliance with Ongoing Mission and BRAC Endangered Species Act consultation.

**5.5.3.11.A.1.1 Analysis Area.** Effects of the proposed action were evaluated within the boundaries of the installation, at Great Spirit Cave, and at bald eagle nesting locations along the Gasconade River. Because analyses showed that BRAC-related activities did not affect Indiana bats and gray bats roosting in Great Spirit Cave or bald eagles nesting near the Gasconade River, there will be no cumulative effects at these location. Therefore, cumulative effects are anticipated only within installation boundaries.

**5.5.3.11.A.1.2 Past and Other Present Actions.** Past and other present actions that have resulted in direct and indirect effects to T & E species are described in section 4.11.1 and include the following.

- At the time of European settlement of Missouri, approximately 66 percent of the state was forested, while in 1989, approximately 33 percent of the state was forested (USDA FS, 1992). Reduction of forest habitats may have directly taken T & E species or indirectly affected them by reducing suitable habitat.
- Mining of saltpeter, a product of bat guano, from caves in the FLW area, may have disturbed cave-dwelling bats, causing them to abandon otherwise suitable habitat. Human disturbance is thought to play a role in population declines of Indiana bats and gray bats.
- Use of pesticides on crops and for insect control. Pesticides may have directly killed or reduced the fecundity of T & E species. Pesticides may indirectly affect T & E species by reducing available prey species.
- Training activities at FLW, including firing munitions, aircraft fly-overs, and ordnance explosions, which generate airborne sound and seismic vibrations. Past and current training missions at FLW require dispersal of smoke obscurants (HC, TPA, and fog oil) in doses that are potentially toxic to wildlife in certain instances. As part of ecological analyses of the Master Plan and Ongoing Mission, FLW complies with USFWS recommendations to avoid impacts to T & E species during activities associated with the Ongoing mission (FLW, 1996e and USFWS, 1996).
- Timber management in the Mark Twain National Forest. Since 1992, timber was harvested over approximately 724 acres within FLW boundaries. However, because timber management emphasizes biodiversity and coordination regarding T & E species is accomplished prior to each harvest, timber harvest is not expected to affect T & E species.
- Implementation of programs such as ITAM and LRAM to integrate habitat conservation with installation activities to ensure sensitive habitats are protected and ecological damages are minimized. Threatened and Endangered species are beneficially affected by ITAM and LRAM because suitable habitat for these species is protected.
- A biomonitoring plan evaluating long-term effects of training activities (FLW 1996e) will beneficially affect T & E species by identifying declines of Indiana bat, gray bat, and bald eagle populations.

**5.5.3.11.A.1.3 Reasonably Foreseeable Future Actions.** Within the analysis area, reasonably foreseeable actions that have been considered for direct and indirect effects in the cumulative effects analysis included the continuation of past and other present actions as described in subsection 5.5.2.1. Modifications and expansions to the continuation of past and other present actions that have the potential to result in cumulative effects include the following.

- Preparation of an Endangered Species Management Plan (ESMP) that will provide management guidelines for Indiana bats, gray bats, and bald eagles. A primary goal of the ESMP is to integrate mission requirements and conservation of T & E species and their habitat.
- Timber harvest as part of FLW forest management. During 1997-1999, FLW plans to harvest timber from approximately 409 acres within installation boundaries. Because timber management practices emphasize biodiversity and coordination regarding T & E species is implemented prior to each harvest, future timber management will not adversely affect T & E species.

**5.5.3.11.A.2 Army's Proposed Action**. The proposed action includes relocation of the U.S. Army Chemical School and U.S. Army Military Police School to FLW. Direct and indirect effects of the Army's Proposed Action to T & E species are discussed in sections 5.2.2.11.A. and 5.3.2.11.A.

**5.5.3.11.A.3 Conclusion (including Mitigation)**. Cumulative effects to T & E species include direct and indirect effects of the proposed action, past and present actions, and reasonably foreseeable future actions. The Army's Proposed Action is likely to adversely affect Indiana bats, gray bats, and bald eagles. The proposed action will not contribute to generation of adverse sound levels in the analysis area. The proposed action includes activities that may generate potentially unsafe concentrations of toxicants in the analysis area, and is likely to decrease the number of acres of mature hardwood forest in the analysis area. However, the USFWS has determined that these effects are not likely to jeopardize the continued existence of any of the three species. Compliance with RPMs issued by the USFWS with the BRAC BO (USFWS, 1997) will reduce impacts to T & E species. In addition, existing ongoing forestry management procedures are designed to ensure mature hardwood forests.

**Bald Eagles -** Cumulative effects to wintering bald eagles include direct and indirect effects of inhaling unsafe concentrations of TPA while traveling across FLW or perching along Roubidoux Creek or the Big Piney River. Reasonable and Prudent Measure No. 4 in the BRAC BO (USFWS, 1997) is designed to reduce incidental take that may be caused by exposure to unsafe concentrations of TPA. The RPM requires analysis of common surrogate species for presence and body burdens of TPA, as well as assessment of lung damage related to excessive TPA exposure. Birds to be used in this analysis will be those that occur on the installation year-round or during the winter and have territories that encompass a 0.25-mile corridor along Roubidoux Creek and Big Piney (areas utilized by bald eagles). Analyses are required during each of five field seasons, beginning in the year TPA deployment is initiated. The USFWS indicated the capture and analysis of surrogate birds is contingent upon acquisition of the proper permits from the MDC and the USFWS.

**Indiana Bats -** Cumulative effects to Indiana bats include the following:

- Indiana bats hibernating in Davis No. 2, Joy, and Wolf Den caves may be affected by inhaling unsafe concentrations of fog oil that is released during mobile smoke training and TPA from smoke pots and grenades. Indiana bats hibernating in Davis No. 2 Cave also may be affected by fog oil released during static smoke training. Compliance with RPMs issued with the BRAC BO will reduce effects of fog oil to Indiana bats hibernating in Davis No. 2, Joy, and Wolf Den caves.
- Foraging and summer roosting Indiana bats may inhale unsafe concentrations of TPA and fog oil released during static and mobile training exercises. Compliance with RPMs issued with the Ongoing Mission BO and BRAC BO will reduce effects of TPA and fog oil to foraging Indiana bats.
- Foraging and summer roosting Indiana bats may inhale unsafe concentrations of Malathion. Compliance with RPMs issued with the Ongoing Mission BO and BRAC BO will reduce effects of Malathion to foraging Indiana bats.
- Tree removal associated with installation development or timber sales may directly affect Indiana bats by take of individuals or maternity colonies or by removing habitat suitable for summer foraging and roosting. Since 1992, timber sales on the installation have occurred on approximately 724 acres of upland area. Construction related to BRAC activities requires removal of 151 acres of moderate quality and 27 acres of low quality Indiana bat summer habitat. During 1997-1999, timber sales within the analysis area are expected to remove trees on approximately 409 acres of upland areas. Compliance with RPMs issued with the BRAC BO will reduce effects of incidental take of individual bats and maternity colonies.
- Bat management zones, established around Brooks, Davis No. 2, Joy, and Wolf Den caves restrict activities near Indiana bat hibernacula thereby avoiding effects to Indiana bats at this location.

**Gray Bats -** Cumulative effects to gray bats include the following:

- Gray bats may be affected by TPA while foraging. Compliance with RPMs issued with the Ongoing Mission BO and BRAC BO will reduce effects to foraging gray bats.

- Gray bats may be affected by Malathion while foraging. Compliance with RPMs issued with the Ongoing Mission BO and BRAC BO will reduce effects of Malathion to foraging gray bats.
- Foraging gray bats may be affected by inhaling unsafe concentrations of fog oil released during static and mobile training exercises.
- Gray bats may be indirectly affected if suitable foraging habitat is removed. Timber will be removed from approximately 2.7 acres of suitable gray bat foraging habitat.
- Gray bats may be affected if suitable foraging habitat is removed. Harvesting occurs on upland areas. Forest management in riparian areas are conducted to enhance forest habitat and watershed management. Since 1992, timber sales on the installation have occurred over 724 acres of upland area. During 1997-1999, timber sales within the analysis area are expected to remove trees on approximately 409 acres of upland area.
- The bat management zone established around Saltpeter No. 3 Cave, restricts activity and maintains forested corridors near the gray bat maternity colony, thereby avoiding effects to gray bats at this location.

**Mitigation.** Fort Leonard Wood will establish management practices to monitor and conserve populations of Indiana bats, gray bats, and bald eagles. Fort Leonard Wood will develop and implement a biomonitoring plan, establish bat management zones around Freeman Cave, and establish a landscape-scale forest management policy.

- **Biomonitoring Plan -** Fort Leonard Wood will develop and implement a biomonitoring program to evaluate toxicological effects of the BRAC action on T & E species and other wildlife. An overview of the total BRAC monitoring program is provided in Appendix K, Vol. III of the FEIS. This program will be implemented prior to the start of BRAC operations and training activities. Under the biomonitoring program, impacts will be assessed and addressed following recommendations of the USFWS.

- **Establish Bat Management Zones.** Transient gray bats utilize Freeman Cave. Recent information indicates that Freeman Cave may be a gray bat maternity site (FLW, 1997). Because the extent of use of Freeman Cave by gray bats was not previously known, Bat Management Zones (established for other caves known to be used by Indiana and gray bats on the installation) were not established for Freeman Cave. As part of the proposed action, Bat Management Zones, similar to existing restrictions, will be established for Freeman Cave. Fort Leonard Wood will establish three bat management zones around Freeman Cave to limit potentially harmful activity near the cave. Within management zones, disturbance from certain training activities (e.g. small arms/weapons) and other human activity is controlled. Limits on activities within these management zones will be identical to those currently in force for Saltpeter No. 3 Cave.

    1) **Establish a Restricted Zone.** Freeman Cave will be off-limits for military operations and training. No development will occur in the 20 acre area (162 meter radius) surrounding the cave. Foot maneuvers are allowed within this area. The use of smoke, CS (Tear) gas, pyrotechnics, or noise simulators are not allowed within the restricted zone between 1 April and 31 October.

    2) **Establish Management Zone 1.** The area located between 162 meters and 457 meters from Freeman Cave (approximately 160 acres (64 hectares)) will be managed in a manner similar to that of the other Bat Management Zones already established at FLW. No bivouac, smoke, CS (tear) gas, or use of noise simulators is permitted between 1 hour before sunset to one hour after sunrise. This restriction applies between 1 April and 31 October. Foot maneuvers are permitted year-round. Development of training facilities and sites will be given low priority within Zone 1.

    3) **Establish Management Zone 2.** The area located between 457 meters and 1,932 meters from Freeman Cave will be managed in a manner similar to that of the other Bat Management Zones already established at FLW. Disruptive activities will be given a low

priority or restricted. Training activities resulting in loss of forest canopy must be approved by the FLW Directorate of Public Works (DPW), Natural Resources Branch.

- **Establish Landscape-Scale Forest Management Policy.** Fort Leonard Wood will develop and implement guidance for forest management activities. The guidelines will describe management to maintain or enhance the quality of forest on the installation for endangered bats. Within one year of receiving the Biological Opinion (from the USFWS) regarding this assessment, FLW will produce a written policy committing to conduct forest management practices in accordance with the new guidelines. The policy statement will specify a two-year schedule to meet the following objectives.

    1) Assess current forest conditions on the installation. Fort Leonard Wood will determine the current amount, types and condition of forest on the installation.

    2) The installation will describe a desired future condition for forest habitat on the installation. The installation desired future condition, consistent with the military mission, will incorporate habitat requirements of endangered bats on a landscape-scale.

    3) Utilize the best available data concerning seasonal habitat requirements of Indiana bats and gray bats to develop standards and guidelines for forest management practices on the Installation.

    4) Identify unique sites such as areas near certain caves and riparian areas that require protection or special management considerations. Develop management guidelines for identified unique sites.

    Fort Leonard Wood will coordinate with the USFWS in developing and meeting these objectives. Fort Leonard Wood will submit annual reports to the USFWS documenting forest management actions and compliance with established standards and guidelines.

### 5.5.3.11.B Other Protected Species

**5.5.3.11.B.1 Introduction.** The cumulative effects of the Proposed Action and other past, present and reasonably foreseeable actions on other protected species (OPS) is of concern to FLW due to the intrinsic value of these species and the concern for their future existence. Since many bird species within the OPS resource category are migratory, cumulative effects for these species have been evaluated during the primary use season, such as the breeding season for neotropical migrant birds (NTMs). Potential effects to resident OPS were evaluated on an annual basis. Information related to forest operations, forest cover, and potential feeding areas was also utilized to determine cumulative effects.

**5.5.3.11.B.1.1 Analysis Area.** The analysis area for OPS included the FLW installation and a one-mile zone around the entire installation. The one-mile zone around the installation, which comprised approximately 33,000 acres, was selected because it was representative of the surrounding habitat types and land uses that were likely to have effects on FLW OPS. The one-mile zone also incorporated all or a significant portion of the home ranges of FLW's nesting migratory birds. Environmental impacts within the installation combined with impacts within the one-mile zone were evaluated to determine cumulative effects for all OPS.

**5.5.3.11.B.1.2 Past and Present Actions.** Past and present actions that impact OPS include other governmental actions and private/civilian actions as discussed in subsection 5.5.2. A summary of past and present actions which have resulted in, or have the potential to result in, direct and indirect effects on OPS include:

- the loss or degradation of OPS habitat as a result of the ongoing mission at FLW including training operations, clearing and/or development in support of the FLW mission, and timber operations;

- the loss or degradation of OPS habitat as a result of clearing and construction on private lands associated with agricultural operations or development projects such as new roads, residential housing, and/or businesses;
- the degradation of OPS habitat as a result of USFS activities such as timber operations;
- habitat improvement/management, species monitoring, and natural resource planning by FLW;
- natural resource conservation, management, and protection by the Houston-Rolla Ranger District of the Mark Twain National Forest; and
- other actions described in the Affected Environment subsection 4.11.

**5.5.3.11.B.1.2 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have the potential to result in cumulative effects to OPS include:

- future range construction projects as listed in subsection 5.5.2.2.1;
- ongoing implementation of natural resource and forest management plans within FLW boundaries and by the US Forest Service on their lands within and around the installation;
- continuation of existing use trends on private lands interspersed throughout the OPS cumulative impact area;
- an increase in the extent of natural resource planning and management and biological monitoring conducted by FLW; and
- an increase in the amount of land included in the management programs and provided protection by the USFS Houston-Rolla District of the Mark Twain National Forest.

**5.5.3.11.B.2 Army's Proposed Action.** Elements of the Army's Proposed Action which are expected to have direct and indirect effects to OPS include:

- vehicle operations on training and maneuver areas as discussed in subsection 5.2.2.11.B;
- release of unburned fuels from FFE deterrents training as discussed in subsection 5.2.2.11.B;
- use of chemical simulants, radiological isotopes, and biological simulants as discussed in subsection 5.2.2.11.B;
- the use of fog oil obscurant as discussed in subsection 5.2.2.11.B; and
- construction of the CDTF (Project 45893), General Instruction Facility (Project 46090), Applied Instruction Facility (Project 46091), Unaccompanied Personnel Housing (Project 46092, and Range Modifications (Project 46094) as discussed in subsection 5.3.2.11.B.

**5.5.3.11.B.3 Conclusion (including Mitigation).** The direct and indirect effects of the proposed action, in association with past, present, and reasonably foreseeable future actions, are likely to result in adverse cumulative impacts to OPS. These impacts would be associated with direct mortality of OPS as a result of vehicle operations, training activities, and clearing associated with new construction. Impacts may also be caused by increased forest fragmentation, and increased disturbance to wildlife from training activities. However, these cumulative impacts will not be significant as discussed below.

Within the one-mile off-post analysis zone, approximately 78.4 percent is covered with brush and/or forest, and approximately 83.3 percent of the installation is covered with various successional stages of forest. Fort Leonard Wood manages the forest resource for a sustained yield of timber and for the benefit of natural resources. Fort Leonard Wood will prepare a Forest Management Plan and intends to designate stands or clusters of timber as old growth stands, or non-cutting stands. From 1972-1989 the amount of forested area in Pulaski County increased by 26.5 percent which indicates that there is no foreseeable trend toward habitat destruction that could have an adverse cumulative effect to OPS (USDA FS, 1991). Within the one-mile analysis zone surrounding the installation, approximately 30 percent of the land is owned by the USFS as part of the Houston-Rolla Ranger District of the Mark Twain National Forest.

Migratory birds, especially NTMs, utilize a variety of habitat types. NTMs may require large tracts of unfragmented mature trees (forest interior species) while others require open areas such as fields or early successional old fields. Many NTMs utilize the ecotone or edge of forested areas and most NTMs utilize a variety of habitats dependant upon the time of year. With changing behavioral activities such as

breeding, mating, feeding, and/or migrating, the habitat requirements for an individual species may change.

The USFS manages resources under a multiple-use concept with the primary goals being the sustained yield of timber products and the conservation of natural resources. Although timber operations on FLW and on the USFS lands may have temporary adverse impacts to OPS, such as mortality to nesting birds, stress from disturbance, and the temporary loss of habitat for some species, the overall effects of timber management on OPS are beneficial. All successional forest stages are represented in the adjacent National Forest and on FLW which provides the greatest potential for habitat diversity. The USFS manages resources on an ecosystem level, and their primary focus for wildlife populations is to manage for biological diversity. Sustained-yield timber management insures that all successional stages, from forest openings to climax communities such as old growth forest, are represented in the National Forest. The diverse array of species that inhabit FLW and the National Forest are indicative of a mosaic of habitat types. From an ecosystem perspective, the overall cumulative effects of the FLW and USFS timber management programs are beneficial.

During construction and training operations, compliance with Federal, state and local permits and regulations, including Missouri Clean Water Commission requirements is obtained through the use of Best Management Practices (BMPs) and other environmental controls as described in subsection 5.3.2.5.A. Since these BMPs and environmental controls are required to minimize soil erosion and protect surface waters, significant sediment or contaminant laden runoff that could pollute or damage OPS habitat will be highly unlikely. Although there is a potential for accidental spills of fog oil, in the rare occurrence of a spill, adverse effects to OPS habitat will be localized and will be minimal due to the low toxicity of fog oil, small amounts likely to be spilled, and the controls established in the Installation's Spill Prevention and Response Plan (Radian 1994) as described in subsection 5.2.2.11.D.2.

Since the potential adverse impacts to OPS from training and construction activities associated with the Army's Proposed Action are minor, and the predicted future activities will be mitigated through environmental controls, the cumulative adverse impacts to terrestrial species from both the ongoing and future mission will be minimal. In order to ensure that these conclusions are valid, the Army has agreed to develop and implement a monitoring plan to address key indicator species of concern. A complete summary of monitoring programs that will be implemented to ensure that implementation of the Proposed Action does not result in significant adverse impacts is provided in Appendix K (Vol III) of the FEIS.

### 5.5.3.11.C Wetlands

**5.5.3.11.C.1 Introduction.** Wetlands are federally protected under the Clean Water Act and Executive Order 11990, because of the destruction or loss of wetlands nationwide, and because they provide vital natural ecosystem functions. For purposes of this EIS cumulative impact analysis, any disturbance of a jurisdictional wetland in excess of one-third acre will be considered to be significantly adverse. Fort Leonard Wood has conducted an installation-wide wetlands inventory (completed prior to announcement of BRAC 95 actions). This inventory of existing, potential jurisdictional wetlands was used to select alternative construction sites that have minimal potential to impact wetlands. Cumulative impact considerations are discussed below.

**5.5.3.11.C.1.1 Analysis Area.** The proposed action will not impact wetlands on or near installation boundaries, and there is no indication that the proposed action will result in any direct or indirect adverse impacts to off-post wetland areas. Therefore, the FLW boundary was selected to define the cumulative effects analysis area for jurisdictional wetlands.

**5.5.3.11.C.1.2 Past and Present Actions.** Past and present actions which have resulted in, or have the potential to result in, direct and indirect effects on wetlands include the loss or degradation of wetlands as a result of the ongoing mission activities at FLW including training operations and clearing and/or facility development in support of the FLW mission as described in subsection 5.5.2.

**5.5.3.11.C.1.2 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions within the FLW impact area that have the potential to enhance or have an adverse impact on wetlands include the continuation of past and present operations and activities and the following additional actions:

- Future construction projects as listed in subsection 5.5.2.2; and
- an increase in the amount of land included in the habitat improvement/management, species monitoring, and natural resource planning by FLW.

**5.5.3.11.C.2 Army's Proposed Action.** Elements of the Army's Proposed Action which have resulted in direct and indirect effects to wetlands include:

- vehicle operations on training and maneuver areas;
- the use of fog oil obscurant; and
- construction of the CDTF (Project 45893) as described in subsection 5.3.2.11.C.

**5.5.3.11.C.3 Conclusion** Implementation of the Army's Proposed Action, in association with other past, present and reasonably foreseeable future actions are expected to cause minor adverse cumulative impacts. These minor adverse impacts would be associated with the physical degradation of wetland vegetation or hydrology through future vehicle operations in wetlands, and the physical degradation or destruction of potential jurisdictional wetlands through construction operations. However, these cumulative impacts will not be significant as discussed below.

There will be a continued potential for minor adverse effects to wetlands as a result of ongoing and new training activities. However, FLW implements BMPs and other environmental controls to minimize soil erosion and protect surface waters, soils, aquatic resources and wetlands during training and construction as described in subsections 5.1.4 and 5.5.1.3. Most of the potentially jurisdictional wetlands that occur on FLW are confined to the Roubidoux and Big Piney Creek watersheds. Due to the physical characteristics of these predominantly bottomland hardwood wetlands, these areas do not typically provide an optimum training environment, and, therefore are not subjected to intense levels of training activity.

The potential for deposition of fog oil on wetland surface waters or soils is not considered to be significant as discussed in previous sections of this EIS.

Jurisdictional wetland determinations have been completed for the CDTF site (Project 45893) in accordance with Section 404 of the Clean Water Act, and FLW has coordinated this evaluation with the USACE. The potential jurisdictional wetland area that will be removed during construction activities at the CDTF is less than 0.14 acres.

Since the potential adverse impacts to wetlands that are associated with training and construction activities are minor, and the predicted future impacts associated with training activities will be mitigated through adherence to operational controls, the cumulative adverse impacts to wetlands from both the ongoing and future mission will be minimal.

### 5.5.3.11.D Aquatic Resources

**5.5.3.11.D.1 Introduction.** Federal statutes such as the Clean Water Act coupled with applicable state laws such as CSR, 1994 and Missouri State Operating Permit MO-0117251 provide applicable water quality standards that must be met by FLW. Any action that would be expected to cause an exceedance of these established standards would be considered to result in a significant adverse impact to aquatic resources.

**5.5.3.11.D.1.1 Analysis Area.** The analysis area for determining cumulative effects to aquatic resources is the installation boundary. As waters leave the installation boundary, they are required to meet applicable MDNR standards and applicable state permits as discussed in subsection 5.5.3.5. Therefore, activities within the installation boundary are not anticipated to impact surface waters or aquatic resources

outside of the installation boundary. (Also see subsection 5.5.3.5.A.1.1 for rationale supporting the use of the installation boundary as the limits of the cumulative impact area for aquatic resources.)

**5.5.3.11.D.1.2 Past and Present Actions**. A summary of past and present actions which have resulted in, or have the potential to result in, direct and indirect effects to aquatic resources include:

- the degradation of aquatic resource habitat as a result of the ongoing mission activities at FLW including training operations and clearing and/or development in support of the FLW mission;
- the potential degradation of aquatic resource habitat as a result of USFS and FLW timber operations within FLW boundaries;
- habitat improvement/management, species monitoring, and natural resource planning by FLW;
- other actions within FLW boundaries as described in the Affected Environment subsection 4.11.

**5.5.3.11.D.1.2 Reasonably Foreseeable Future Actions**. Reasonably foreseeable future actions that have been considered in the cumulative impact analysis include the continuation of past and present actions within FLW boundaries and the following actions:

- new construction projects (per subsection 5.5.2.1); and
- an increase in the amount of land included in the habitat improvement/management, species monitoring, and natural resource planning by FLW.

**5.5.3.11.D.2 Army's Proposed Action**. Elements of the Army's Proposed Action which have resulted in direct and indirect effects to aquatic resources include:

- potential accidental spills of fog oil;
- in-stream or in-lake vehicle operations;
- vehicle operations on training and maneuver areas;
- release of unburned fuels from FFE deterrent training; and
- construction of the General Officers Quarters (Project 38174), 16-Building MOUT Facility (Project 45892), CDTF (Project 45893), General Instruction Facility (Project 46090), Applied Instruction Facility (Project 46091), Unaccompanied Personnel Housing (Project 46092), and Range Modifications (Project 46094) as described in subsection 5.3.2.11.D.

**5.5.3.11.D.3 Conclusion (including Mitigation)**. After reviewing the direct and indirect effects of the proposed action coupled with the past, present, and reasonably future actions, it is likely that there may be minor adverse cumulative impacts to aquatic resources. However, these cumulative impacts will not be significant based on the conclusions that follow.

Despite past actions that could have adversely impacted surface waters, the water quality of the Big Piney River and Roubidoux Creek have been considered good to excellent with a diverse biotic fauna as described in subsections 4.5.1, 5.2.2.11.D.3, and 5.5.3.5. These factors provide evidence that the cumulative effects of adverse activities upstream from the installation coupled with the installations past and present activities has had no significant adverse impact on aquatic resources.

During ongoing operations at FLW including construction and training operations, compliance with Federal, state and local permits and regulations, including Missouri Clean Water Commission requirements is obtained through the use of BMPs and other environmental controls as described in subsection 5.3.2.5.A. Since these BMPs and environmental controls are required to minimize soil erosion and protect surface waters, significant sediment or contaminant laden runoff into surface water will be highly unlikely. Although there is a potential for accidental spills of fog oil into surface waters, in the rare occurrence of a spill, adverse effects to aquatic resources will be minimal due to the low toxicity of fog oil, small amounts likely to enter surface waters, and the controls established in the Spill Prevention and

Response Plan (Radian, 1994) as described in subsection 5.2.2.11.D.2. Potential impacts from in-stream vehicle operations and hasty decon training will be localized and very minor.

Minor adverse effects to aquatic resources are expected to occur as a result of ongoing FLW operations and new training activities. However, FLW implements BMPs and other environmental controls to minimize soil erosion and protect surface waters, soils, aquatic resources and wetlands during training and construction as described in subsections 5.1.4 and 5.5.1.3. Since the potential adverse impacts to aquatic resources associated with training and construction activities are minor, and the predicted future activities will be mitigated through environmental controls, the cumulative adverse impacts to aquatic species from both the ongoing and future mission will be minimal. The BMPs will reduce minimal impacts at project and training sites to non-detectable levels at installation boundaries.

### 5.5.3.11.E Terrestrial Resources

**5.5.3.11.E.1 Introduction.** Terrestrial resources provide the fundamental base on which the processes of a natural ecosystem function. Since this resource category incorporates all vegetation communities and most common resident fauna including mammals, amphibians, reptiles, and nonmigratory birds, it is essential that FLW be aware of potential cumulative adverse impacts to terrestrial species, populations and/or communities.

**5.5.3.11.E.1.1 Analysis Area.** The cumulative impact analysis area for terrestrial resources includes all lands within FLW boundaries and a one-mile analysis zone around the entire installation. The one-mile zone around the installation, which comprised approximately 33,000 acres, was selected because it was representative of the surrounding habitat types and land uses that were likely to have effects on terrestrial species that range off of the installation. The one-mile zone incorporated all or a significant portion of the home ranges for terrestrial species, such as white-tailed deer, turkey, northern bobwhite, and various reptiles and amphibians, that were likely to utilize on-post and off-post habitats .

**5.5.3.11.E.1.2 Past and Present Actions.** Past and present actions that impact terrestrial resources include other governmental actions and private/civilian actions as discussed in subsection 5.5.2. A summary of past and present actions which have resulted in, or have the potential to result in, direct and indirect effects to terrestrial resources include:

- the degradation of terrestrial habitat as a result of the ongoing mission at FLW including training operations and clearing and/or development in support of the FLW mission;
- the degradation of terrestrial habitat as a result of clearing and construction on private lands associated with development projects such as new roads, residential housing, and/or businesses;
- the degradation of terrestrial habitat as a result of agricultural practices on private lands such as clearing and conversion of forest to cool season pasture, livestock operations, and the use of pesticides and fertilizers;
- the potential degradation of terrestrial species habitat as a result of USFS and FLW timber harvest operations;
- habitat improvement/management, species monitoring, and natural resource planning by FLW; and
- natural resource conservation, management, and protection by the USFS on the Houston-Rolla Ranger District of the Mark Twain National Forest.

**5.5.3.11.E.1.2 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered for direct and indirect effects in the cumulative impacts analysis include the continuation of past and present actions and the following activities:

- new construction projects (per subsection 5.5.2.1);
- an increase in the amount of land included in the habitat improvement/management, species monitoring, and natural resource planning by FLW; and

- an increase in the amount of land included in the management programs and provided protection by the USFS Houston-Rolla District of the Mark Twain National Forest.

**5.5.3.11.E.2 Army's Proposed Action.** Elements of the Proposed Action which have resulted in direct and indirect effects to terrestrial resources include:

- vehicle operations on training and maneuver areas as described in subsection 5.2.2.11.E;
- release of unburned fuels from FFE deterrent training as described in subsection 5.2.2.11.E;
- the use of fog oil obscurant as described in subsection 5.2.2.11.E; and
- construction of the CDTF (Project 45893), General Instruction Facility (Project 46090), Applied Instruction Facility (Project 46091), Unaccompanied Personnel Housing (Project 46092), and Range Modifications (Project 46094) as described in subsection 5.3.2.11.E.

**5.5.3.11.E.3 Conclusion (including Mitigation).** After reviewing the direct and indirect effects of the proposed action in association with applicable past, present, and reasonably future actions, it is anticipated that there will be minor adverse cumulative impacts to terrestrial resources. However, these cumulative impacts will not be significant based on the following conclusions.

Despite past actions, such as those activities associated with the ongoing training mission, that have adversely impacted terrestrial resources, FLW has a diverse population of plants and animals as described in subsections 4.11, 5.2.2.11.E.3, and Appendix F. The fauna that inhabit FLW frequently utilize habitats on and off-post. Within the one-mile off-post analysis zone, approximately 78.4 percent is covered with brush and/or forest, and approximately 83.3 percent of the installation is covered with various successional stages of forest. Fort Leonard Wood manages the forest resource for a sustained yield of timber and for the benefit of natural resources. Fort Leonard Wood will develop a Forest Management Plan and intends to designate stands or clusters of timber as old growth stands, or non-cutting stands.

From 1972-1989 the amount of forested area in Pulaski County increased by 26.5 percent which indicates that there is no foreseeable trend toward habitat destruction that could have an adverse cumulative effect to terrestrial species (USDA FS, 1991). Within the one-mile analysis area surrounding the installation, approximately 30 percent of the land is owned by the USFS as part of the Houston-Rolla Ranger District of the Mark Twain National Forest. The USFS manages resources under a multiple-use concept with the primary goals being the sustained yield of timber products and the conservation of natural resources. Although timber operations on FLW and on the USFS lands may have temporary adverse impacts to terrestrial resources, such as an increased erosion potential and the temporary loss of habitat for some species, the overall effects of timber management on terrestrial resources are beneficial. The USFS manages resources on an ecosystem level, and their primary focus for terrestrial fauna populations is to manage for biological diversity. Sustained-yield timber management insures that all successional stages, from forest openings to climax communities such as old growth forest, are represented in the National Forest. The diverse array of terrestrial species that inhabit FLW and the National Forest are indicative of a mosaic of habitat types. From an ecosystem perspective, the overall cumulative effects of the FLW and USFS natural resource management programs are beneficial.

During ongoing FLW operations, including construction and training operations, compliance with Federal, state and local permits and regulations, including Missouri Clean Water Commission requirements is obtained through the use of BMPs and other environmental controls as described in subsection 5.3.2.5.A. Since these BMPs and environmental controls are required to minimize soil erosion and protect surface waters, significant sediment or contaminant laden runoff into surface waters that could pollute terrestrial species water supplies will be highly unlikely. Although there is a potential for accidental spills of fog oil, in the rare occurrence of a spill, adverse effects to terrestrial resources will be localized and will be minimal due to the low toxicity of fog oil, small amounts likely to be spilled, and the controls established in the Spill Prevention and Response Plan (Radian, 1994) as described in subsection 5.2.2.11.D.2.

Minor adverse effects to terrestrial resources are expected to occur as a result of training. However, FLW implements BMPs and other environmental controls to minimize soil erosion and protect surface waters,

soils, aquatic resources and wetlands during training and construction as described in subsections 5.1.4 and 5.5.1.3. Since the potential adverse impacts to terrestrial resources associated with training and construction activities are minor, and the predicted future activities will be mitigated through environmental controls, the cumulative adverse impacts to terrestrial species from both the ongoing and future mission will be minimal.

### 5.5.3.12 Cultural Resources

As discussed in subsections 5.2.2.12 and 5.3.2.12, Phase 1 archaeological surveys have been conducted at all of the locations where BRAC-related training and construction activities will occur on FLW. Current implementation plans do not include the alteration, renovation, or demolition of any historic buildings or structures, and activities will not impact any of the known NRHP eligible cultural resources. Coordination with the Missouri State Historic Preservation Officer resulted in a finding of no effect for planned construction activities. Training activities are conducted in accordance with FLW Regulation 210-14. Therefore, if archaeological materials are identified during any future construction or training activity, the activity will be stopped, and the FLW cultural resource specialist will be contacted to determine an appropriate course of action. Because there are no known impacts on cultural resources associated with the proposed training and construction actions, the proposed action will not contribute to cumulative impacts and no further analysis is warranted.

### 5.5.3.13 Sociological Environment

**5.5.3.13.1 Introduction**. Cumulative effects to the sociological environment are defined through consideration of population growth, housing demand, school enrollment increase or decrease, and public service delivery demands resulting from the proposed action in combination with past, present and reasonably foreseeable future demands indigenous to the region.

**5.5.3.13.1.1 Analysis Area.** The general analysis area for the sociological environment is the nine-county socioeconomic Region of Influence (ROI), with more specific analysis as appropriate for Pulaski County. The rationale for the use of the referenced nine-county ROI is presented in subsection 4.13.1.2.

**5.5.3.13.1.2 Past and Present Actions**. Past and present actions which have resulted in, or have the potential to result in, direct and indirect effects on the sociological environment include:

- population growth within the nine-county region, a growth rate (7 percent increase for the 1980-1990 period) which has been stable but exceeding the state-wide growth rate (4 percent) (Census, 1990);
- a net regional in-migration of population stimulated by industrial development, and the recreation and retirement industries;
- drawdowns and buildups in military strength at FLW affecting the regional population base, especially in Pulaski County;
- the boom in the tourist and recreational industry in the Lake of the Ozarks region;
- new housing construction ranging between an estimated 1,200-1,500 units per year in the nine-county region based on past and current trends, with new development continuing to be concentrated in the Lake of the Ozarks, Rolla, Lebanon and St. Robert-Waynesville areas. An estimated 1,400-1,500 new housing units were constructed in 1996 according to county assessor records. Any future new off-post housing directly resulting from FLW realignments/buildups would be in addition to the above;
- construction of an estimated 600 to 800 new housing units to accommodate the increased housing demand of the realigned FLW population;
- a modest increase in school enrollments associated with regional population increases, with an overall regional increase of five percent between 1980\81 and 1991\92 compared to . a seven percent decline state-wide (UE, 1992);
- vacillating school enrollments in the Waynesville R-VI District reflecting changing military operations at FLW; and

- expansion of the local municipal and regional service delivery systems such as health care, fire and police protection, etc. (e.g. the number of physicians increased 23 percent from 1981 to 1991 within this nine-county region of the state, a rate greatly exceeding the increase in regional population during the same period (UE, 1992)).

**5.5.3.13.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered in the cumulative impact analysis included the continuation of past and present actions, as discussed above including a projected regional population growth rate of 7-10 percent per decade (exclusive of any major population shifts associated with FLW operations\realignments), exceeding the projected state-wide growth rate of 4 percent (DEMOG, 1995).

**5.5.3.13.2 Army's Proposed Action.** Elements of the Army's Proposed Action which have been considered include projected increases in associated military and civilian population and school age dependents.

**5.5.3.13.3 Conclusion (including Mitigation).** Implementation of the Army's Proposed Action, in association with other past, present and reasonably foreseeable future actions is not expected to cause any significant adverse local or regional sociological impacts. The majority of the direct sociological impacts will occur locally in Pulaski County, primarily in the St. Robert\Waynesville area. The RTV (Rational Threshold Value), or measurement of significance, is exceeded for the regional population increase resulting from the proposed action when combined with the normal annual population growth in the region. However, this growth and the associated extra demands on the public service delivery systems can be adequately accommodated by existing community resources and proper planning and programming for their expansion. Impacts on school enrollment will be primarily within the Waynesville R-VI District which has made, or is in the process of making, plans to address the expanded enrollment resulting from the proposed action. The anticipated enrollment increase, however, will be approximately equal to the overall District enrollment level that was attained in 1992 prior to military downsizing at FLW.

Mitigation of adverse sociological impacts will be partially accomplished through phased implementation of the proposed action. The construction program and the population relocation are spread out over a period of time (2 years and 6 to 9 months respectively). In addition, the time between the announcement of the Proposed Action to the public, and implementation of the initial phases of the action is sufficient to provide the opportunity for planning and programming to prepare for the initial and continuing impacts of the proposed action on local and regional resources.

Planning assistance, in the form of grant funding under the auspices and assistance of the DOD Office of Economic Adjustment, will also be used to assist the local communities that are potentially impacted by the proposed action. These planning assistance funds will be used for the development of a "growth management plan" and implementation program designed at accommodating the off-post development impacts of the proposed action in a planned and orderly manner. The overall objectives of this planning program include the development of a consistent set of planning and development policies, and zoning and building code regulations; the provision of diverse affordable house for the anticipated in-migration of military and civilian personnel associated with the proposed action; and coordination of the required expansion and improvements to the infrastructure and public service delivery systems serving the affected communities.

### 5.5.3.14 Economic Development

**5.5.3.14.1 Introduction.** Cumulative effects to economic development are defined by various economic indicators including gains in employment, business volume, population and income generated by economic activity. Changes in these indicators associated with the Proposed Action, in association with other past, present and reasonably foreseeable future actions are predicted through application of the Economic Impact Forecasting System (EIFS) computer model. Other measurements of economic activity include industrial and commercial expansion and housing construction, and the growth in assessed valuation and tax base as a result of these actions.

**5.5.3.14.1.1 Analysis Area.** The analysis area for the assessment of the cumulative economic development impacts is the nine-county Region of Influence (ROI). The rationale for the use of the referenced nine-county ROI is presented in subsection 4.13.1.2.

**5.5.3.14.1.2 Past and Present Actions.** Past and present actions which have resulted in, or have the potential to result in, direct and indirect effects on economic development include:

- establishment and continuance of daily operations at FLW with an annual operating budget exceeding $474 million;
- construction activities at FLW in addition to daily installation operations;
- continuance of off-post housing and commercial\industrial development, which had a total combined assessed valuation of $1.105 billion in 1996 within the nine-county ROI - a 28 percent increase since 1990 (MOTC, 1997);
- development and growth of the tourist and recreation industry in the Lake of the Ozarks area;
- a regional annual employment growth rate approximating 2.7 percent, greater than the state-wide annual growth rate of less than 2.0 percent (MDLIR, 1995b);
- establishment of an economy evolving into one primarily based upon government, retail trade and services as the primary employment sectors;
- predominance of small businesses (less than 20 employees) comprising over 90 percent of the total businesses within the nine-county region (UE, 1992);
- establishment of a small industrial base, comprised primarily of light industries concentrated within or adjacent to the major population and economic centers of the region;
- continual expansion of the business economy with taxable sales of $1.630 billion in 1995 within the nine-county ROI - a 40 percent increase (non-adjusted for inflation) since 1990 (MODR, 1997);
- continual increases in the regional wage and salary base with total wages and salaries (not including agricultural and self-employed persons) approximating $1.283 billion in 1995 - a 30 percent increase (non-adjusted for inflation) since 1990 (MDLIR, 1995a), representing a five percent annual growth increase;
- conversion of over 1,000 acres of agricultural and open land annually to urban land uses (primarily residential) within the nine-county ROI; and
- regional transportation improvements, primarily the construction of I-44.

**5.5.3.14.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered include the continuation of past and present economic development trends as discussed above (including both non-BRAC future construction on FLW and in the surrounding region).

**5.5.3.14.2 Army's Proposed Action.** Elements of the Army's Proposed Action which will result in direct and indirect effects to economic development include an increase in military and civilian population; and on-post construction activity associated with the proposed realignment action.

**5.5.3.14.3 Conclusion (including Mitigation).** Application of the EIFS model to the Army's Proposed Action (as presented in previous subsections of this document) illustrate the general magnitude and type of beneficial economic development impacts that are expected to occur. No additional EIFS model runs were conducted in support of the cumulative impact analysis since the EIFS model already accounts for past, present and future economic development activities that are expected to occur in the 9-county Region of Influence through the use of various multipliers and trend projections that are built into the model. Therefore, the cumulative economic impacts and related mitigation measures or programs designed to avoid or minimize any negative indirect impacts are the same as those described in subsection 5.5.3.13.3.

Economic impacts described in subsection 5.5.3.13.3 relate to increased income, employment and business volume. Other major indirect impacts include increases in the area's real property tax base (assessed valuation) and local tax revenues. The majority of the direct economic impacts will occur locally in Pulaski County, primarily in the St. Robert\Waynesville area. The RTV, or measurement of

significance, is exceeded only for employment when the increase in employment resulting from the proposed action is combined with the normal annual employment growth in the region.

### 5.5.3.15 Quality of Life

### 5.5.3.15.A Quality of Life

**5.5.3.15.A.1 Introduction.** Based on consideration of the prior subsections that evaluated the impacts of the Army's Proposed Action on Quality of Life, the only issue that warrants consideration of cumulative effects relates to the potential reduction in access to public land for recreational use.

**5.5.3.15.A.1.1 Analysis Area.** Public lands (FLW and Mark Twain National Forest) in Pulaski, Texas and Laclede Counties define the analysis area for the cumulative effects analysis for the "quality of life" issue.

**5.5.3.15.A.1.2 Past and Present Actions.** Past and present actions which have resulted in, or have the potential to result in, direct and indirect effects on quality of life as defined in subsection 5.5.3.15.A.1 include:

- Ongoing training, facilities maintenance, and facilities construction activities on-post at FLW; and
- Activities in the Mark Twain National Forest, including logging operations, road building, timber maintenance, and other activities associated with the operation of a multi-use National Forest.

**5.5.3.15.A.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered include the continuation of past and present actions, as discussed above.

**5.5.3.15.A.2 Army's Proposed Action.** Elements of the Army's Proposed Action which will result in direct and indirect effects to the quality of life issue identified above include:

- Addition of the training activities associated with the U.S. Army Chemical School and the U.S. Army Military Police School to the training activities currently conducted at FLW.

**5.5.3.15.A.3 Conclusion (including Mitigation).** No significant adverse impacts are expected to occur under the quality of life evaluation category and no mitigation is required. Implementation of the Army's Proposed Action will result in an increase in the type and amount of training activities to occur within the training range areas at FLW, which will result in increased use of these areas. These increased use levels are expected to result in a minor adverse impact by imposing additional limitations on the recreational use (e.g., hunting, fishing and other activities) of these areas while training occurs. The extent of additional access restrictions cannot be determined at this time due to the requirement for the Army to conduct fog oil training in accordance with strictly monitored weather conditions.

However, hunting, trapping and fishing are allowed on all National Forest System lands, except in developed sites, and the US Forest Service is continuing to purchase additional private lands and adding them to the Mark Twain National Forest as funds and land areas become available. Therefore, although implementation of the Army's Proposed Action is expected to have a short-term adverse cumulative impact on the availability of public lands for recreation, it is logical to assume that these lost opportunities may be regained as Forest Service holdings increase over time. No new developed areas are planned for the Mark Twain National Forest in the 3-county analysis area, therefore, additional restrictions to lands available for hunting, trapping and fishing are not anticipated.

### 5.5.3.15.B Human Health and Safety.

**5.5.3.15.B.1 Introduction.** This subsection evaluates the cumulative effects of the Army's Proposed Action, in association with other past, present and reasonably foreseeable actions on human health and safety. The evaluation criteria for determining a significant direct impact to humans from airborne exposure to fog oil is 5 $mg/m^3$ TLV-TWA. The fog oil exposure standard is equivalent to the protective standard established by ACGIH and OSHA for mineral oil mists (fog oil is a mineral oil) in the air at

industrial settings. This concentration has been determined to be safe for workers to breathe 8 hours per day, 5 days per week, over a worker's career. Safe inhalation exposure values established by USEPA for individual compounds contained in fog oil will also be used to evaluate the potential for direct health impacts, as will compliance with NAAQS for PM-10 and ozone at the installation boundary (the FLW cantonment area is considered to be outside of the installation boundary for these purposes).

Human health criteria related to indirect exposures will include applicable regulatory health standards for chemical constituents in drinking water, and an ingestion standard of 6 mg/kg/day for low toxicity oils equivalent to fog oil. The ingestion standard will apply to foods (e.g., vegetables in residential gardens) that have been exposed to fog oil mist in the air and are then consumed by humans. For the purpose of this analysis, a cumulative effect that results in an exceedance of health based standards for chemicals in the air in the FLW cantonment area and beyond the installation boundary, and in potable water supplies or food, would be considered a significant adverse impact.

**5.5.3.15.B.1.1 Analysis Area.** The analysis area for cumulative impacts to human health includes all areas contained within the FLW boundary with the exception of the on-post cantonment area. Figure 3.3 in the EIS defines the FLW cantonment area and post boundary. This analysis area was selected because compliance with provisions of the fog oil training air permit and the implementation of pertinent controls for planned actions are expected to eliminate the potential for significant exposures that would impact human health, in the cantonment area of the post and beyond the FLW boundary.

**5.5.3.15.B.1.2 Past and Present Actions**. Past and present actions collectively considered in this cumulative analysis are discussed in subsection 5.5.2.1.1. The past and present actions which have resulted in or have the potential to result in direct and indirect effects on human health are focused primarily on those which may impact air quality. For this evaluation, current (background) air quality at the boundary of FLW and at the boundary defining the cantonment area, is assumed to represent the sum of all past and present sources of emissions. The combining of current background concentrations with those predicted from fog oil training will allow an estimate of the potential for exceeding air quality standards, and will offer insight on the potential for health impacts. (See subsection 5.5.3.3 for discussion of cumulative air quality analysis.)

Past and present actions that have the potential for impacting surface waters and groundwater which may be used for drinking water are also considered. Section 4 of the EIS describes the existing environment at FLW for establishing baseline conditions and therefore take into account past and present actions. The FLW area which includes Pulaski, Texas and Laclede counties are currently in attainment for primary and secondary National Air Quality Standards (NAAQS) for protection of human health and public welfare, respectively, as well as the Missouri ambient air quality standards.

**5.5.3.15.B.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered for cumulative impacts analysis, include the continuation of past and present action trends, as discussed above. Based on the analysis presented in subsection 5.5.3.15.B.1.2, those activities that have the potential to cause increases in air emissions are given emphasis in this cumulative analysis for human health. Reasonably foreseeable future actions on-post will involve the construction of new facilities, modernization of existing facilities, and future and planned training at FLW. The construction activities are considered to have a temporary impact on local air quality because they are considered a nonrecurring activity. Subsection 5.5.3.3.1.3, discusses potential impacts to air quality from reasonably foreseeable future sources in the FLW area. FFE Deterrents Training described in subsection 3.3.3.1, toxic agent training at the CDTF discussed in subsection 3.3.3.6.2, and fog oil obscurant training addressed in subsection 3.3.3.7, are future planned training actions with the potential to affect human health.

As discussed at 5.5.3.3.1.3, no reasonably foreseeable future actions that have the potential to impact human health from air quality were identified in the FLW area by the Missouri Department of Transportation (MoDOT), Missouri Department of Natural Resources (MDNR) or the U.S. Forest Service.

**5.5.3.15.B.2 Army's Proposed Action.** Elements of the Army's Proposed Action which may result in direct and/or indirect effects to human health are:

- Fog oil obscurant training;
- Training with toxic agents at the CDTF; and
- FFE deterrents training.

**5.5.3.15.B.3 Conclusion (including Mitigation).** This cumulative impact analysis considered the different direct and indirect effects of implementing the Army's Proposed Action in association with other past, present and reasonably foreseeable future actions within the specified impact analysis area. The following conclusions were reached:

- Cumulative direct or indirect human health effects are not anticipated from fog oil obscurant training. The main human exposure route for fog oil is through inhalation and the human health effects of inhaling fog oil obscurant are detailed in subsection 5.2.2.15.B. Inhalation exposures to fog oil exceeding health criteria are not anticipated in the cantonment area of FLW, nor beyond FLW boundaries. The primary reason for low inhalation exposures (below health criteria) involves the restrictions specified in the fog oil air permit issued by MDNR. These restrictions are set to protect human health according to the daily and annual NAAQS. Provisions in the Clean Air Act (CAA) pertaining to attainment areas like FLW, prevent future degradation of air quality. These CAA provisions will assure that NAAQS in the FLW region are not exceeded, thus providing present and future human health protection.

  In support of the air quality impact analysis for the EIS, additional modeling was performed to estimate concentrations for fog oil use rates of 1,200 GPH and 1,900 GPH. The OPTM and EPTM Alternatives specify a 24 hour fog oil maximum use of 1,200 gallons. When 1,200 gallons are used in one hour to generate fog oil obscurant, the total maximum concentrations (includes the volatile and non-volatile fractions) predicted by the model at the FLW boundary and at the boundary of the cantonment area are less than 95 $\mu g/m^3$. The estimated concentration predicted using the OPTM and EPTM Alternatives would be 53 times lower than the level considered safe for workers in an industrial setting. Human health effects are not anticipated for the general population in the cantonment area and for those individuals beyond the facility boundary, from the very low concentrations of fog oil predicted by the model. As previously stated, if the general public is inadvertently exposed to fog oil, the exposures are anticipated to be infrequent and of short duration.

  Additional testing, as discussed in subsection 5.2.2.15.B.1, of fog oil smoke for mutagenicity will be conducted. Modeling of fog oil dispersion was conducted in conjunction with the FLW air permit for fog oil training. A copy of the fog oil air permit is provided in Volume III, Appendix J of the FEIS. Discussions of the modeling and results are found in subsections 5.2.2.3.7 and 5.5.3.3.3 of the EIS. The Gaussian steady state model, used a fog oil consumption rate of 481 gallons per hour (GPH) and determined dispersion from four different FLW locations where training will be conducted. This fog oil use rate is the daily amount allowed under the current FLW air permit for fog oil training. Modeling was conducted for the different meteorological conditions and wind states allowed by the air permit for training. The model predicted concentrations at the edge of the FLW boundary and at the edge of the on-post cantonment area of fog oil would not exceed 0.03 $mg/m^3$ (30 $\mu g/m^3$). The model assumed 30 percent of the fog oil compounds will volatilize from the fog oil by the time it reaches the FLW boundary and cantonment area. To more conservatively estimate maximum total fog oil concentration at these boundaries, the volatile fraction was added to the 30 $\mu g/m^3$ concentration, resulting in a total concentration of 43 $\mu g/m^3$.

- Cumulative direct or indirect human health effects from contamination of drinking water are not anticipated from FFE deterrent training. A discussion of the health effects of toxic agent training at the CDTF is found at subsection 5.2.2.15.B.5. Discussions in subsections 5.1.4.2, 5.5.3.6 and 5.5.3.5.A identify engineering controls and management practices to be employed at the FFE

deterrent training site for reducing the potential to contaminate surface water and groundwater. These controls are considered effective for the avoidance of human health impacts.

- Cumulative direct or indirect health impacts to the general public as a result of toxic agent training at the CDTF are not anticipated. Training is rigidly controlled to protect the health and safety of the soldiers that are trained at the CDTF facility at FMC. The same protective measures will be employed at FLW. In over 10 years of toxic agent training involving over 25,000 soldiers at the CDTF at FMC, there has not been an incident involving toxic agents that has compromised human health. Although the health protection record at the CDTF at FMC is unblemished, there is a remote possibility that the integrity of protective gear worn by soldiers during training may be compromised allowing direct exposure to a toxic agent. In this case there would be the potential for direct, acute health impacts. The amounts of VX and GB used in a training room are small and are adjusted so that a soldier can lose respiratory protection for up to 29 minutes without incurring severe, life-threatening effects.

### 5.5.3.16 Installation Agreements

As discussed in subsections 5.2.2.16, 5.3.2.16, and 5.4.2.16 implementation of the phased relocation of personnel to FLW will result in a requirement to develop new Intraservice and Interservice Support Agreements among the various components operating at FLW. No impacts are expected to occur as a result of the development of these new agreements, and the new agreements would be based on current FLW agreements that are similar in scope and nature. Because there are no impacts on installation agreements associated with the proposed training and construction actions there will be no cumulative impacts.

### 5.5.3.17 Operational Efficiency

**5.5.3.17.1 Introduction.** Cumulative effects of implementing the Army's Proposed Action on operational efficiency are defined by the quality of training that individual students receive, the quality of training provided to units, and the cost of supporting training.

**5.5.3.17.1.1 Analysis Area.** The analysis area for considering operational efficiency is the installation boundary (including the Mark Twain National Forest lands within the installation boundary) and other proximate Mark Twain National Forest lands that are used to support some training activities.

**5.5.3.17.1.2 Past and Present Actions.** Past and present actions which have resulted in, or have the potential to result in, direct and indirect effects on operational efficiency include:

- Ongoing administrative, training, facilities maintenance, and facilities construction activities on-post at FLW; and
- Activities in the Mark Twain National Forest, including logging operations, road building and maintenance, off-road vehicle use, as well as other activities.

**5.5.3.17.1.3 Reasonably Foreseeable Future Actions.** Reasonably foreseeable future actions that have been considered include the continuation of past and present actions, as discussed above, and the following actions:

- Redesignation of land use and training areas to meet changing mission requirements; and
- The completion of the currently scheduled construction projects.

**5.5.3.17.2 Army's Proposed Action.** Elements of the Army's Proposed Action which have resulted in direct and indirect effects to operational efficiency include:

- Determination of the training methods which will be employed to support the training activities associated with the US Army Chemical School and the US Army Military Police School, including the selection and implementation of the OPTM Alternative as the preferred training method; and

- Redesignation of land use and training areas to meet changing mission requirements as called for in the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) including the construction of BRAC related construction projects as part of the proposed action.

**5.5.3.17.3 Conclusion (including Mitigation).** The collocation and consolidation of the three schools as specified by the Army's Proposed Action provides the maximum amount of interaction among the Military Police, Chemical and Engineer headquarters, school staff and students. The increased interaction will improve the potential for positive synergism created by the interaction of students and staff at the schools. Synergistic effects will include:

- improved battlefield coordination and communication, through the better understanding of each others missions and capabilities; and
- improved battlefield capabilities and procedures developed through increased training interaction.

Additionally this alternative will provide more effective training realism based on providing more training time in the field, developing improved applied skills and thereby resulting in better trained soldiers. Specifically, the OPTM Alternative would improve effectiveness in training for 17 training goals when compared to the RCP Alternative and for six training goals when compared to the EPTM Alternative. To meet the desired level of training effectiveness and realism for the OPTM Alternative, the level of training materials used, specifically for fog oil obscurant training, will be greater than for the EPTM Alternative.

# SUBSECTION 5.5.4

# Evaluates - Environmentally Preferred Training Method (EPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Instruction), and Phased Move

## Figure 5.1
## Environmental Impact Analysis Process Summary

1. **Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.20; Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5-32; Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.21; Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.33; Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.22; Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion; Summary Table 5.34; Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.5.4 CUMULATIVE IMPACTS: Environmentally Preferred Training Method (EPTM); Army's Proposed Land Use and Facility Plan; and Phased Population Move

### 5.5.4.1 Introduction

The cumulative impacts of implementing the Environmentally Preferred Training Method (EPTM) Alternative Training Method in combination with the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) and the Phased Population Move are presented in this subsection. The information presented for each of the environmental evaluation categories in subsection 5.5.3 (Cumulative Impacts of the Army's Proposed Action) regarding the cumulative impact analysis areas, and applicable past, present, and reasonably foreseeable future actions are identical for all cumulative alternatives, and will not be repeated. Information presented under this BRAC implementation alternative is generally limited to identifying differences in the alternative relative to cumulative impacts identified for the Army's Proposed Action.

### 5.5.4.2 Land Use and Training Areas.

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.2.1 within the analysis area will result in the same direct and indirect cumulative impacts as discussed in subsection 5.5.3.2.2.2. As described in subsection 5.5.3.2.3, there are no adverse cumulative impacts anticipated from the implementation of the proposed action on land use and training areas. No mitigation is necessary.

### 5.5.4.3 Air Quality and Climate.

**5.5.4.3.1 EPTM, Army's Proposed Land Use Plan and Phased Population Move.** As discussed in subsection 5.5.2.2, the EPTM Alternative will result in a reduction of fog oil usage to 49,500 gallons (188,100 liters) per year for training activities. This will reduce overall fog oil emissions by an estimated 41 percent compared to the OPTM Alternative, thus the annual ambient air quality impacts will be reduced. See Table 5.59 for a summary of annual air emissions associated with the EPTM Alternative. However, the daily use for fog oil training is anticipated to be up to 1,200 gallons per day for certain training scenarios and therefore the daily ambient air quality impacts remain the same as for the OPTM, causing an exceedance of the PM-10 24-hour NAAQS. Therefore, the EPTM Alternative will require mitigation for maximum daily fog oil usage to the same level as the OPTM Alternative, with daily training limits being set in accordance with the fog oil air permit at 3,700 pounds (approximately 481 gallons) per day. There is no mitigation required for annual fog oil usage level.

Dispersion modeling was not conducted for the EPTM Alternative because the level of annual usage of fog oil and corresponding amount of emissions for the EPTM Alternative are substantially less than the permitted conditions used in the dispersion modeling for the OPTM Alternative, which resulted in levels below the annual PM-10 NAAQS. For the daily limit, training within the fog oil permit limit of 3,700 pounds (approximately 481 gallons (1,828 liters)) will be required to stay within the 24-hour PM-10 NAAQS as was the case for the OPTM Alternative, as noted in subsection 5.5.3.3.

| Table 5.59: Summary of Annual Air Quality Annual Emissions for EPTM (tons per year) | | | | | | |
|---|---|---|---|---|---|---|
| **Training/ Emission Source** | **Section Reference** | **NOx** | **SOx** | **PM-10** | **VOC** | **CO** |
| FFE Deterrent Train. | 5.2.2.3.1 | 0.19 | 0 | 6.25 | 8.05 | 13.01 |
| Firing of Ammunition (smoke pots/smoke grenades) | 5.2.2.3.2 | 0 | 0 | 5.81 | 0 | 0.24 |
| BIDS | 5.2.2.3.3 | 0 | 0 | 0.04 | 0.02 | 0 |
| NBC | 5.2.2.3.4 | 0 | 0 | 1.6 | 0.75 | 0 |
| New Simulants | 5.2.2.3.5 | 0 | 0 | 0 | 1.73 | 0 |
| CDTF | 5.2.2.3.6 | 33.5 | 6.9 | 1 | 1.4 | 13.3 |
| Fog Oil /Obscurant | 5.2.2.3.7 | 0.64 | 0.53 | 143.98 | 57.04 | 0.31 |
| Miscellaneous Class Support | 5.2.2.3.11 | 0 | 0 | 0 | 0.01 | 0 |
| Construction | 5.3.2.3.1 | 0 | 0 | Not quantified | 0 | 0 |
| Utilities | 5.3.2.3.2 | 6.75 | 10.6 | 0.61 | 0.25 | 1.56 |
| Vehicle Maintenance | 5.4.2.3.1 | 0 | 0 | < 0.05 | 3.1 | 0 |
| Unpaved Road Emissions During Training | 5.2.2.3 | 0 | 0 | 31 | 0 | 0 |
| Fuels Management | 5.4.2.3.2 | 0 | 0 | 0 | 0.24 | 0 |
| *Source: Harland Bartholomew & Associates, Inc* | | | | | | |

**5.5.4.3.2 Conclusion (including Mitigation).** Implementation of the EPTM Alternative will result in the use of up to 49,500 gallons (188,100 liters) of fog oil per year. Usage of this quantity of fog oil will be in compliance with the existing permit and within the annual PM-10 NAAQS. However, the EPTM Alternative would require FLW to pursue a modification to the permit for the daily limit of 3,700 pounds (approximately 481 gallons (1,828 liters)) per day because of the desire to conduct fog oil training at a usage rate of up to 1,200 gallons (4,560 liters) per day for certain training courses. Until such time that a revised permit is approved training will comply with the existing permit. Other mitigation elements will be the same as presented for the OPTM Alternative in subsection 5.5.3.3.

### 5.5.4.4 Noise

**5.5.4.4.1 EPTM, Army's Proposed Land Use Plan and Phased Population Move.** As discussed in subsection 5.5.3.4.2 indirect cumulative impacts associated with the slight increase in noise levels at the installation will include the possible disturbance of nearby on- and off-post activities from the use of live-fire ammunition and explosives, additional aircraft operations, construction and maintenance activities, and vehicle operations.

Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.4.1 within the analysis area will result in the following cumulative impacts.

**5.5.4.4.2 Conclusion (including Mitigation).** The differential direct and indirect effects of the cumulative effects of the proposed action on the existing noise environment associated with the implementation of the EPTM Alternative for Mark-19 training will result in reduced noise impacts on the surrounding environment than would be anticipated if the OPTM Alternative training methods were implemented. The impacts associated with implementing the OPTM Alternative are discussed in subsection 5.5.3.4.3. As discussed in subsection 5.5.3.4.3, after reviewing the differential direct and indirect effects of the cumulative effects of the proposed action on the existing noise environment, it would

appear that the increased noise level will not significantly degrade the existing noise environment, and is unlikely to result in the generation of additional noise complaints. Consequently, no mitigation is necessary.

Continued coordination between the installation and the Regional Commerce and Growth Association in Pulaski County and the cities of Crocker, Dixon, Richland, Waynesville, and St Robert which is intended to help eliminate or reduce the potential for conflicts between on-post and off-post activities, should help eliminate the negative impacts associated with modifications in the existing noise contours, as part of the ICUZ and other management programs.

#### 5.5.4.5 Water Resources

#### 5.5.4.5.A Floodplains/Surface Water.

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.5.A.1 will result in the same cumulative impacts as are discussed in subsection 5.5.3.5.A.2. As described in subsection 5.5.3.5.A.3, minor adverse cumulative impacts are anticipated in surface waters as a result of the past and present actions, proposed actions, and reasonably foreseeable future actions.

#### 5.5.4.5.B Hydrology/Groundwater

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.5.B.1 will result in the similar cumulative impacts that are discussed in subsection 5.5.3.5.B.2. As described in subsection 5.5.3.5.B.3, when the mitigation is considered it is anticipated that there will not be a significant impact to ground water.

#### 5.5.4.6 Geology and Soils

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.6.1 will result in the same cumulative impacts that are discussed in subsection 5.5.3.6.2. As described in subsection 5.5.3.6.3, when the mitigation is considered it is anticipated that there will not be a significant impact to soil and geology.

#### 5.5.4.7 Infrastructure

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.7.1 will result in the same cumulative impacts as are discussed in subsection 5.5.3.7.2. As described in subsection 5.5.3.7.3, there are no significant adverse cumulative impacts anticipated due to the added demand on infrastructure.

#### 5.5.4.8 Hazardous and Toxic Materials

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.8.1 will result in the same cumulative impacts as are discussed in subsection 5.5.3.8.2. As described in subsection 5.5.3.8.3, there are no adverse cumulative impacts anticipated in the ability of FLW to carry out safe environmental management of the handling, storage, transporting and disposal of increased amounts of hazardous materials, low-level radioactive materials, regulated medical wastes, fuels, and special wastes. No mitigation is necessary.

### 5.5.4.9 Munitions

As discussed in subsection 5.5.3.9 implementation of the phased relocation of personnel to FLW will result in an increase in the type and quantity of live munitions, obscurants and signals used at FLW. No direct or indirect impacts to munitions storage and operations are expected to occur as a result of the increase in types and quantities of munitions used at FLW. Because there are no impacts on munitions associated with the proposed action the increase in type and quantities of munitions will not contribute to the cumulative effects of past, present, or future actions in the analysis area.

### 5.5.4.10 Permits and Regulatory Authority

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.10.1 will result in the same cumulative impacts as are discussed in subsection 5.5.3.10.1. No mitigation is necessary.

### 5.5.4.11 Biological Resources

### 5.5.4.11.A Federal Threatened and Endangered Species.

**5.5.4.11.A.1 Introduction.** The cumulative effect of the proposed action includes direct and indirect effects of past, present, and reasonably foreseeable future actions on federally endangered Indiana bats and gray bats and the federally threatened bald eagle. The analysis area, evaluation criteria, and past, other present, and reasonably foreseeable future actions for this implementation alternative (EPTM/CH&I/Phased Move) are identical to those considered in the analysis of the Army's Proposed Action as discussed in subsection 5.5.3.11.A.1.

The EPTM Alternative differs from the Army's Proposed Action because fog oil released during static training exercises does not affect Indiana bats or gray bats. Therefore, exposure of threatened and endangered species to fog oil smoke would be reduced as compared to the Army's Proposed Action as described in the BRAC BA (FLW, 1997). Under the EPTM Alternative, bats in Wolf Den, Joy, and Davis No. 2 caves may be affected by mobile smoke operations. Mobile smoke may also affect foraging and roosting Indiana bats. Static smoke operations will not affect Indiana or gray bats during foraging or roosting.

**5.5.4.11.A.2 Conclusion.** Based upon analysis of direct and indirect effects of past, present, and reasonably foreseeable future actions, the EPTM, CH&I, and Phased Population Move Alternative is likely to adversely affect Indiana bats, gray bats, and bald eagles. The proposed action will not contribute to generation of adverse sound levels in the analysis area. However, the proposed action includes activities likely to generate potentially unsafe concentrations of toxicants in the analysis area and is likely to decrease the number of acres of mature hardwood forest in the analysis area.

Effects of the EPTM, CH & I and Phased Population Move Alternative are evaluated in this impact statement (subsections 5.2.2.11.A and 5.3.2.11.A). Should the EPTM, CH&I and Phased Population Move Alternative be selected for implementation, it will undergo formal consultation under Section 7 of the Endangered Species Act. This process might result in formulation of RPMs by the USFWS. Implementation of such RPMs might reduce effects to threatened and endangered species that are currently described for the EPTM, CH&I and Phased Population Move Alternative.

Fort Leonard Wood will establish management practices to conserve Indiana bats, gray bats, and bald eagles. Discussion of these management practices may be found in section 5.5.3.11.A.3.

### 5.5.4.11.B Other Protected Species

**Conclusion (including Mitigation).** There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative.

Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.B. Therefore, there will be minor cumulative adverse impacts to OPS from this alternative, however there will be no significant cumulative effects.

### 5.5.4.11.C Wetlands

**5.5.4.11.C.2 Conclusion (including Mitigation).** There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative (Environmentally Preferred Training Method with the Army's Proposed Land Use and Facility Plan). Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.C. Therefore, there will be minor cumulative adverse impacts to wetlands from this alternative, however there will be no significant cumulative effects.

### 5.5.4.11.D Aquatic Resource

**Conclusion (including Mitigation).** There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.D. Therefore, there will be minor cumulative adverse impacts to aquatic resources from this alternative, however there will be no significant cumulative effects.

### 5.5.4.11.E Terrestrial Resources

**Conclusion (including Mitigation).** There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.E. Therefore, there will be minor cumulative adverse impacts to terrestrial resources from this alternative, however there will be no significant cumulative effects.

### 5.5.4.12 Cultural Resources

As discussed in subsections 5.5.3.12, Phase 1 archaeological surveys have been conducted at all of the locations where BRAC related training and construction activities will occur on FLW. Current implementation plans do not include the alteration, renovation, or demolition of any historic buildings or structures, and activities will not impact any of the known NRHP eligible cultural resources. Training activities are conducted in accordance with FLW Regulation 210-14 and if during training exercises archaeological materials are identified, then training will be stopped and the FLW archaeologist will be contacted for instructions. Because there are no impacts on cultural resources associated with the proposed training and construction actions, the proposed action will not contribute to the cumulative effects of past, present, or reasonably foreseeable future actions in the analysis area.

### 5.5.4.13 Sociological Environment

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.13.1 will result in the same cumulative impacts as are discussed in subsection 5.5.5.13.2. Conclusions and mitigation measures under this alternative are also the same as those described in subsection 5.5.13.3.

### 5.5.4.14 Economic Development

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.14.1 with result in the same cumulative impacts as are discussed in subsection 5.5.3.14.2. Conclusions and mitigation measures under this alternative are also the same as those described in subsection 5.5.4.13.3.

### 5.5.4.15 Quality of Life

### 5.5.4.15.A Quality of Life

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.15.A.2 will result in the same cumulative impacts as are discussed in subsection 5.5.3.15.A.2. No mitigation is necessary.

### 5.5.4.15.B Quality of Life (Human Health and Safety)

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.15.B, will result in the same cumulative impacts discussed at subsection 5.5.3.15.B.2. As discussed at subsection 5.5.3.15.3, there are no adverse cumulative human health impacts anticipated from obscurant training with fog oil, training with toxic agents at the CDTF, and FFE deterrents training when conducted in accordance with Army guidelines. No mitigation is necessary.

### 5.5.4.16 Installation Agreements

As discussed in subsection 5.5.3.16 implementation of the phased relocation of personnel to FLW will result in a requirement to develop new Intraservice and Interservice Support Agreements among the various components operation at FLW. No impacts are expected to occur as a result of the development of these new agreements, and the new agreements would be based on current FLW agreements that are similar in scope and nature. The current agreements specify that environmental compliance, and management and disposal of hazardous waste will be conducted in accordance with the FLW Hazardous Waste Management Plan, FLW 220-01, AR 200-1, AR 200-2 and all Federal, state and local environmental laws and regulations. Because there are no impacts on installation agreements associated with the proposed training and construction actions, the proposed action will not contribute to the cumulative effects of past, present, or future actions in the analysis area.

### 5.5.4.17 Operational Efficiency

**5.5.4.17.1 EPTM, Army's Proposed Land Use Plan and Phased Population Move.** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.17.1 within the analysis area will result in the following cumulative impacts.

- Determination of the training methods which will be employed to support the training activities associated with the US Army Chemical School and the US Army Military Police School, including the selection and implementation of the EPTM Alternative training methods; and
- Redesignation of land use and training areas to meet changing mission requirements as called for in the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) including the construction of BRAC related construction projects as part of the proposed action.

**5.5.4.17.2 Conclusion (including Mitigation).** After reviewing the differential direct and indirect effects associated with implementing the EPTM Alternative training methods at the locations specified in the Combined Headquarters and Instruction Land Use and Facility Plan with the phased movement of

personnel tied to the availability of facilities, the collocation and consolidation of the three schools offered by this alternative provide the setting for the maximum amount of interaction among the Military Police, Chemical and Engineer headquarters, school staff and students. The increased interaction will improve the potential for positive impacts related to the synergism created by the interaction of students and staff at the schools. Synergistic effects will include:

- improved battlefield coordination and communication, through the better understanding of each others missions and capabilities; and
- improved battlefield capabilities and procedures developed through increased training interaction.

This increase in the potential for interaction between the staff and students of the Engineer School, Chemical School, and Military Police School is a result of the collocation of the three headquarters and schools under this land use and facility plan. This interaction will provide improved training opportunities among the schools with a net result of increased capabilities, coordination and communication.

Implementation of this reasonable alternative will however include the use of the EPTM Alternatives. When compared to the OPTM Alternative, use of the training methods included in the EPTM Alternative will reduce training realism and effectiveness for six of the 43 training goals (when compared to the OPTM Alternative) based on reduced training time in the field. This reduction in important field training for chemical soldiers does not provide a soldier that is as highly trained as the OPTM Alternative would.

# SUBSECTION 5.5.5

# Evaluates - Army's Proposed Training Method (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative → **Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative → **Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative → **Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.5.5 CUMULATIVE IMPACTS: Army's Proposed Training Method (OPTM); Army's Alternative 1 Land Use and Facility Plan; and Phased Population Move

### 5.5.5.1 Introduction

The cumulative impacts of implementing the Army's proposed Optimum Training Method (OPTM) in combination with the Alternative 1 Land Use and Facility Plan (Combined Headquarters) and the Phased Population Move are presented in this subsection. The information presented for each of the environmental evaluation categories in subsection 5.5.3 (Cumulative Impacts of the Army's Proposed Action) regarding the cumulative impact analysis areas, and applicable past, present, and reasonably foreseeable future actions are identical for all cumulative alternatives, and will not be repeated. Information presented under this BRAC implementation alternative is generally limited to identifying differences in the alternative relative to cumulative impacts identified for the Army's Proposed Action.

### 5.5.5.2 Land Use and Training Areas

**Conclusion (including Mitigation).** After reviewing the differential direct and indirect effects of the cumulative effects of the proposed action on land use and training areas, implementation of the proposed action will result in beneficial modifications to the existing on and off-post land use patterns associated with the development of additional civilian residential and commercial activities in the urban and rural communities surrounding FLW.

The modifications to these items offered by this land use and facility plan will not capture the full benefits for synergistic effects as discussed in subsection 5.5.5.17; however neither of these types of impacts are anticipated to be significant. As discussed in subsection 5.5.3.2.2 continued coordination between the installation and the Regional Commerce and Growth Association in Pulaski County and the cities of Crocker, Dixon, Richland, Waynesville, and St Robert should help eliminate or reduce the potential for conflicts between on- and off-post activities. These ongoing coordination efforts, and the additional residential and commercial development near the installation, should augment continued efforts to improve the appearance of the civilian and military facilities in the area. No mitigation is necessary.

### 5.5.5.3 Air Quality and Climate

**5.5.5.3.1 OPTM, Alternative 1 Land Use Plan and Phased Population Move.** As discussed in subsection 5.5.3.3, expanded training activities using the OPTM alternative will result in fog oil usage of up to 84,500 gallons per year for training activities. See subsection 5.5.3.3 for a summary of annual air emissions associated with the OPTM.

**5.5.5.3.2 Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have a similar level of cumulative impacts as those discussed in subsection 5.5.3.3.1. Therefore, there will be significant adverse impacts associated with the OPTM and this alternative will require mitigation to train at permitted levels as described in subsection 5.5.3.4.3.

### 5.5.5.4 Noise

**5.5.5.4.1 OPTM, Alternative 1 Land Use Plan and Phased Population Move.** As discussed in subsection 5.5.3.4.2.1, expanded training activities using the OPTM, when added to the short-term impacts associated with BRAC related construction activities and increased aircraft operations at Forney Army Airfield will result in slight modifications in the existing noise contours illustrated on Figure 4.3. The direct impacts associated with this alternative will vary from those stated in subsection 5.5.3.4.2.1 in that the training and construction activities would be located at the locations specified in the Alternative 1

(Combined Headquarters) Land Use and Facility Plan sites. It is anticipated that these modifications will not be significant from a noise zone standpoint, or from a noise complaint basis.

#### 5.5.5.4.2 Conclusion (including Mitigation).

After reviewing the differential direct and indirect effects of the cumulative effects of the proposed action on the existing noise environment, it would appear that the increased noise level will not significantly degrade the existing noise environment, is unlikely to result in the generation of additional noise complaints. The noise impacts associated with implementing this alternative will be similar to those associated with implementing the Army's Proposed Action (as discussed in subsection 5.5.3.4.3) although the locations of training and construction actions will be at the Alternative 1 (Combined Headquarters) Land Use and Facility Plan locations. Consequently, no mitigation is necessary.

Continued coordination between the installation and the Regional Commerce and Growth Association in Pulaski County and the cities of Crocker, Dixon, Richland, Waynesville, and St Robert which is intended to help eliminate or reduce the potential for conflicts between on-post and off-post activities, should help eliminate the negative impacts associated with modifications in the existing noise contours, as part of the ICUZ and other management programs.

### 5.5.5.5 Water Resources

#### 5.5.5.5.A Floodplains/Surface Water

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, an reasonably foreseeable future actions identified in subsection 5.5.3.5.A.1 will result in the same cumulative impacts as discussed in subsection 5.5.3.5.A.2. As discussed in subsection 5.5.3.5.A.3, minor adverse cumulative impacts are anticipated in surface waters as a result of the past and present actions, proposed actions, and reasonably foreseeable future actions.

#### 5.5.5.5.B Hydrology/Groundwater

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.5.B.1 will result in the similar cumulative impacts that are discussed in subsection 5.5.3.5.B.2. There is a slight difference resulting from this alternative using the alternative 1 land use and facility plan rather than the Army's proposed land use and facility plan. The difference in impact to ground water related to the different land use plan is described in subsection 5.2.3.5.B. As described in subsection 5.5.3.5.B.3, when the mitigation is considered it is anticipated that there will not be a significant impact to ground water.

### 5.5.5.6 Geology and Soils

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.6.1 will result in the similar cumulative impacts that are discussed in subsection 5.5.3.6.2. There is a slight difference resulting from this alternative using the alternative 1 land use and facility plan rather than the Army's proposed land use and facility plan. The difference in impact to soils and geology related to the different land use plan is described in subsection 5.2.3.6. As described in subsection 5.5.3.6.3, when the mitigation is considered it is anticipated that there will not be a significant impact to soil and geology.

### 5.5.5.7 Infrastructure

**Conclusion (including Mitigation).** After reviewing the direct and indirect effects on infrastructure of the past and present actions, proposed actions, and reasonably foreseeable future actions it is anticipated

that there may be minor adverse cumulative impacts to traffic systems. Through the use of mitigation measures cumulative impacts to the traffic systems will not be significant.

An increase in traffic volume and delays is anticipated as a result of the BRAC action. When compared to the Army's Proposed LU & FP (CH&I), the Alternative 1 LU & FP (CH) will disperse traffic throughout the cantonment area. This will result in reduced concentration of traffic around Lincoln Hall, but increased congestion elsewhere within the cantonment area. There are no anticipated roadway or intersection construction improvements associated with the Alternative 1 facilities. Delays due to congestion throughout the cantonment area will therefore be worse under this alternative. Improvements to striping and signalization at numerous intersections as recommended in MTMCTEA Report INH 95-23 *BRAC Impact Analysis of Military Police and Chemical Schools Realignment* (MTMC, 1996), will serve to reduce the impact of the added traffic volume at FLW.

Indirect cumulative impacts include: increased energy demands due to increased effective population and facilities at FLW; increased traffic volume on the I-44 Business Spur and Missouri Avenue and to a lesser degree other roadways that access FLW; increased delays at intersections as described in subsection 5.3.2.7.3; and increased use of Highway 17 as a route to access FLW as a result of improvements.

The existing utility systems have adequate capacities and, following extension and upgrade of distribution and collection systems, will be able to accommodate the added demand of the BRAC activities, while continuing to meet regulatory compliance. Energy, communication systems, and solid waste disposal provided by outside sources will be adjusted by the supplier to meet the increased demand without impacting the environment. Energy consumption at FLW will increase but energy efficient facility construction and continue expansion of the natural gas system should help reduce the environmental impact of energy usage.

Direct cumulative impacts include extension and upgrade of existing utility distribution and collection systems to service the Evasive Driving Training facility and the CDTF.

#### 5.5.5.8 Hazardous and Toxic Materials

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.8.1 will result in the same cumulative impacts as are discussed in subsection 5.5.3.8.2. As described in subsection 5.5.3.8.3, there are no adverse cumulative impacts anticipated in the ability of FLW to carry out safe environmental management of the handling, storage, transporting and disposal of increased amounts of hazardous materials, low-level radioactive materials, regulated medical wastes, fuels, and special wastes. No mitigation is necessary.

#### 5.5.5.9 Munitions

As discussed in subsection 5.5.3.9 implementation of the phased relocation of personnel to FLW will result in an increase in the type and quantity of live munitions, obscurants and signals used at FLW. No direct or indirect impacts to munitions storage and operations are expected to occur as a result of the increase in types and quantities of munitions used at FLW. Because there are no impacts on munitions associated with the proposed action the increase in type and quantities of munitions will not contribute to the cumulative effects of past, present, or future actions in the analysis area.

#### 5.5.5.10 Permits and Regulatory Authority

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.10.1 will result in the same cumulative impacts as are discussed in subsection 5.5.3.10.1. No mitigation is necessary.

### 5.5.5.11 Biological Resources

#### 5.5.5.11.A Federal Threatened and Endangered Species.

**5.5.5.11.A.1 Introduction**. The cumulative effect of the proposed action includes direct and indirect effects of past, present, and reasonably foreseeable future actions on federally endangered Indiana bats and gray bats and the federally threatened bald eagle. The analysis area, evaluation criteria, and past and reasonably foreseeable future actions for implementing this (OPTM, CH and Phased Population Move) alternative are identical to those considered in the analysis of the Army's Proposed Action as discussed in subsection 5.5.3.11.A.1. The amount of habitat removed for the Combined Headquarters (CH) Alternative differs from the Combined Headquarters and Instruction alternative. For the CH Alternative, approximately 21 acres of moderate quality and about 272 acres of low quality habitat for Indiana bats will be removed. About 7.3 acres of habitat suitable for gray bats will be removed.

**5.5.5.11.A.2 Conclusion**. Based upon analysis of direct and indirect effects of past, present, and reasonably foreseeable future actions, the OPTM, CH and Phased Population Move Alternative is likely to adversely affect Indiana bats, gray bats, and bald eagles. The proposed action will not contribute to generation of adverse sound levels in the analysis area. However, the proposed action includes activities likely to generate potentially unsafe concentrations of toxicants in the analysis area and is likely to decrease the number acres of mature hardwood forest in the analysis area.

Effects of the OPTM, CH, and Phased Population Move Alternative are evaluated in this impact statement (subsections 5.2.2.11.A and 5.3.2.11.A). Should the OPTM, CH, and Phased Population Move Alternative be selected for implementation, it will undergo formal consultation under Section 7 of the Endangered Species Act. This process might result in formulation of RPMs by the USFWS. Implementation of such RPMs might reduce effects to T & E species that are currently described for the OPTM, CH and Phased Population Move Alternative.

Fort Leonard Wood will establish management practices to conserve Indiana bats, gray bats, and bald eagles. Discussion of these management practices may be found in section 5.5.3.11.A.3.

#### 5.5.5.11.B Other Protected Species

**Conclusion (including Mitigation)**. There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.B. Therefore, there will be minor cumulative adverse impacts to OPS from this alternative, however there will be no significant cumulative effects.

#### 5.5.5.11.C Wetlands

**Conclusion (including Mitigation)**. There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.C. Therefore, there will be minor cumulative adverse impacts to wetlands from this alternative, however there will be no significant cumulative effects.

#### 5.5.5.11.D Aquatic Resources

**Conclusion (including Mitigation)**. There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative

impacts as those discussed in subsection 5.5.3.11.D. Therefore, there will be minor cumulative adverse impacts to aquatic resources from this alternative, however there will be no significant cumulative effects.

### 5.5.5.11.E Terrestrial Resources

**Conclusion (including Mitigation).** There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.E. Therefore, there will be minor cumulative adverse impacts to terrestrial resources from this alternative, however there will be no significant cumulative effects.

### 5.5.5.12 Cultural Resources

As discussed in subsections 5.5.3.12, Phase 1 archaeological surveys have been conducted at all of the locations where BRAC related training and construction activities will occur on FLW. Current implementation plans do not include the alteration, renovation, or demolition of any historic buildings or structures, and activities will not impact any of the known NRHP eligible cultural resources. Training activities are conducted in accordance with FLW Regulation 210-14 and if during training exercises archaeological materials are identified, then training will be stopped and the FLW archaeologist will be contacted for instructions. Because there are no impacts on cultural resources associated with the proposed training and construction actions, the proposed action will not contribute to the cumulative effects of past, present, or reasonably foreseeable future actions in the analysis area.

### 5.5.5.13 Sociological Environment

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.13.1 will result in the same cumulative impacts as are discussed in subsection 5.5.3.13.2. Conclusions and mitigation measures under this alternative are also the same as those described in subsection 5.5.3.13.3.

### 5.5.5.14 Economic Development

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.14. The conclusions regarding cumulative economic development impacts of the proposed action and applicable mitigation measures are the same as those described in subsection 5.5.3.14.3.

### 5.5.5.15 Quality of Life

### 5.5.5.15.A Quality of Life

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.15.A.2 will result in the same cumulative impacts as are discussed in subsection 5.5.3.15.A.2. No mitigation is necessary.

### 5.5.5.15.B Quality of Life (Human Health and Safety)

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.15.B, will result in the same cumulative impacts discussed at subsection 5.5.3.15.B.2. As discussed at subsection 5.5.3.15.3, there are no adverse cumulative human health

impacts anticipated from obscurant training with fog oil, training with toxic agents at the CDTF, and FFE deterrents training when conducted in accordance with Army guidelines. No mitigation is necessary.

### 5.5.5.16 Installation Agreements

As discussed in subsection 5.5.3.16 implementation of the phased relocation of personnel to FLW will result in a requirement to develop new Intraservice and Interservice Support Agreements among the various components operation at FLW. No impacts are expected to occur as a result of the development of these new agreements, and the new agreements would be based on current FLW agreements that are similar in scope and nature. The current agreements specify that environmental compliance, and management and disposal of hazardous waste will be conducted in accordance with the FLW Hazardous Waste Management Plan, FLW 220-01, AR 200-1, AR 200-2 and all Federal, state and local environmental laws and regulations. Because there are no impacts on installation agreements associated with the proposed training and construction actions, the proposed action will not contribute to the cumulative effects of past, present, or future actions in the analysis area.

### 5.5.5.17 Operational Efficiency

**5.5.5.17.1 OPTM, Alternative 1 Land Use Plan and Phase Personnel Move.** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.17.1 within the analysis area will result in the following cumulative impacts.

- Determination of the training methods which will be employed to support the training activities associated with the US Army Chemical School and the US Army Military Police School, including the selection and implementation of the OPTM Alternative as the preferred training method; and
- Redesignation of land use and training areas to meet changing mission requirements as called for in the Alternative 1 Land Use and Facility Plan (Combined Headquarters) including the construction of BRAC related construction projects as part of the proposed action.

**5.5.5.17.2 Conclusion (including Mitigation).** After reviewing the differential direct and indirect effects associated with implementing this reasonable alternative, the potential for the collocation and consolidation of the three schools offered by this alternative (and the associated potential for positive synergistic effects) will be much lower for this alternative land use and facility plan than those offered by the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction). The full potential for positive, synergistic effects and interaction is limited by the location of the instruction facilities away from the headquarters.

Training effectiveness for the OPTM Alternative, when compared to the EPTM Alternative, will be more effective, as described in subsection 5.5.3.17.3.

# SUBSECTION 5.5.6

# Evaluates - Environmentally Preferred Training Method (EPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative → **Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative → **Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative, OPTM Alternative (Army's Proposed), EPTM Alternative → **Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.5.6 CUMULATIVE IMPACTS: Environmentally Preferred Training Method (EPTM); Alternative 1 Land Use and Facility Plan; and Phased Population Move

### 5.5.6.1 Introduction

The cumulative impacts of implementing the Environmentally Preferred Training Method (EPTM) in combination with the Alternative 1 Land Use and Facility Plan (Combined Headquarters) and the Phased Population Move are presented in this subsection. The information presented for each of the environmental evaluation categories in subsection 5.5.3 (Cumulative Impacts of the Army's Proposed Action) regarding the cumulative impact analysis areas, and applicable past, present, and reasonably foreseeable future actions are identical for all cumulative alternatives, and will not be repeated. Information presented under this BRAC implementation alternative is generally limited to identifying differences in the alternative relative to cumulative impacts identified for the Army's Proposed Action.

### 5.5.6.2 Land Use and Training Areas

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.2.1 within the analysis area will result in the same direct and indirect cumulative impacts as discussed in subsection 5.5.5.2.2. As described in subsection 5.5.5.2.3, there are no adverse cumulative impacts anticipated from the implementation of the proposed action on land use and training areas. No mitigation is necessary.

### 5.5.6.3 Air Quality and Climate

**5.5.6.3.1 EPTM, Army's Proposed Land Use Plan and Phased Personnel Move.** As discussed in subsection 5.5.4.3, the EPTM alternative will result in a reduction of fog oil usage to 49,500 gallons (188,100 liters) per year for training activities. This will reduce overall fog oil emissions by an estimated 41 percent compared to the OPTM, thus the annual ambient air quality impacts will be reduced.

**5.5.6.3.2 Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have a similar level of cumulative impacts as those discussed in subsection 5.5.4.3. Therefore, there will be significant adverse impacts associated with the EPTM and this alternative will require mitigation, to train within existing permitted levels as described in subsection 5.5.4.3.3.

### 5.5.6.4 Noise

**5.5.6.4.1 EPTM, Alternative 1 Land Use Plan and Phased Population Move.** The differential direct and indirect effects of the cumulative effects of the proposed action on the existing noise environment associated with the implementation of the EPTM for Mark-19 training will result in reduced noise impacts on the surrounding environment than would be anticipated if the OPTM training methods were implemented. The impacts associated with implementing the OPTM are discussed in subsection 5.5.3.4.

**5.5.6.4.2 Conclusion (including Mitigation).** As discussed in subsection 5.5.3.4, after reviewing the differential direct and indirect effects of the cumulative effects of the proposed action on the existing noise environment, it would appear that the increased noise level will not significantly degrade the existing noise environment, and is unlikely to result in the generation of additional noise complaints, although the locations of training and construction actions will be at the Alternative 1 (Combined Headquarters) Land Use and Facility Plan locations. Consequently, no mitigation is necessary.

Continued coordination between the installation and the Regional Commerce and Growth Association in Pulaski County and the cities of Crocker, Dixon, Richland, Waynesville, and St Robert which is intended to

help eliminate or reduce the potential for conflicts between on-post and off-post activities, should help eliminate the negative impacts associated with modifications in the existing noise contours, as part of the ICUZ and other management programs.

### 5.5.6.5 Water Resources

#### 5.5.6.5.A Floodplains/Surface Water

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.5.A.1 will result in the same cumulative impacts as discussed in subsection 5.5.3.5.A.2. As discussed in subsection 5.5.3.5.A.3, minor adverse cumulative impacts are anticipated in surface waters as a result of the past and present actions, proposed actions, and reasonably foreseeable future actions.

#### 5.5.6.5.B Hydrology/Groundwater

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.5.B.1 will result in the similar cumulative impacts that are discussed in subsection 5.5.3.5.B.2. The difference in impact to ground water related to the different land use plan is described in subsection 5.2.3.5.B. As described in subsection 5.5.3.5.B.3, when the mitigation is considered it is anticipated that there will not be a significant impact to ground water.

### 5.5.6.6 Geology and Soils

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.6.1 will result in the similar cumulative impacts that are discussed in subsection 5.5.3.6.2. The difference in impact to soils and geology related to the different land use plan is described in subsection 5.2.3.6. As described in subsection 5.5.3.6.3, when the mitigation is considered it is anticipated that there will not be a significant impact to soil and geology.

### 5.5.6.7 Infrastructure

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.5.7.1 will result in the same cumulative impacts as are discussed in subsection 5.5.5.7.2. As described in subsection 5.5.5.7.3, there are no significant adverse cumulative impacts anticipated due to the added demand on infrastructure.

### 5.5.6.8 Hazardous and Toxic Materials

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.8.1 will result in the same cumulative impacts as are discussed in subsection 5.5.3.8.2. As described in subsection 5.5.3.8.3, there are no adverse cumulative impacts anticipated in the ability of FLW to carry out safe environmental management of the handling, storage, transporting and disposal of increased amounts of hazardous materials, low-level radioactive materials, regulated medical wastes, fuels, and special wastes. No mitigation is necessary.

### 5.5.6.9 Munitions

As discussed in subsection 5.5.3.9 implementation of the phased relocation of personnel to FLW will result in an increase in the type and quantity of live munitions, obscurants and signals used at FLW. No direct or indirect impacts to munitions storage and operations are expected to occur as a result of the

increase in types and quantities of munitions used at FLW. Because there are no impacts on munitions associated with the proposed action the increase in type and quantities of munitions will not contribute to the cumulative effects of past, present, or future actions in the analysis area.

### 5.5.6.10 Permits and Regulatory Authority

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.10.1 will result in the same cumulative impacts as are discussed in subsection 5.5.3.10.1. No mitigation is necessary.

### 5.5.6.11 Biological Resources

### 5.5.6.11.A Federal Threatened and Endangered Species.

**5.5.6.11.A.1 Introduction.** The cumulative effects of the proposed action includes direct and indirect effects of past, present, and reasonably foreseeable future actions on federally endangered Indiana bats and gray bats and the federally threatened bald eagle. The analysis area, evaluation criteria, and past and reasonably foreseeable future actions for this implementation (EPTM, CH and Phased Population Move) alternative are identical to those considered in the analysis of the Army's Proposed Action as discussed in subsection 5.5.3.11.A.1. The EPTM Alternative differs from the Army's Proposed Action because fog oil released during static training exercises does not affect Indiana bats or gray bats. The amount of habitat removed for the Combined Headquarters (CH) Alternative differs from the Combined Headquarters and Instruction Alternative. For the CH Alternative, approximately 21 acres of moderate quality and about 272 acres of low quality habitat for Indiana bats will be removed. About 7.3 acres of habitat suitable for gray bats will be removed.

**5.5.6.11.A.2 Conclusion.** Based upon analysis of direct and indirect effects of past, present, and reasonably foreseeable future actions, the EPTM, CH and Phased Population Move Alternative is likely to adversely affect Indiana bats, gray bats, and bald eagles. The proposed action will not contribute to generation of adverse sound levels in the analysis area. However, the proposed action includes activities likely to generate potentially unsafe concentrations of toxicants in the analysis area and is likely to decrease the number of acres of mature hardwood forest in the analysis area.

Effects of the EPTM, CH and Phased Personnel Move Alternative is evaluated in this impact statement (subsections 5.2.2.11.A and 5.3.2.11.A). Should the EPTM, CH and Phased Population Move Alternative be selected for implementation, it will undergo formal consultation under Section 7 of the Endangered Species Act. This process might result in formulation of RPMs by the U.S. Fish and Wildlife Service. Implementation of such RPMs might reduce effects to threatened and endangered species over those currently described for the EPTM, CH and Phased Population Move Alternative.

Fort Leonard Wood will establish management practices to conserve Indiana bats, gray bats, and bald eagles. Discussion of these management practices may be found in section 5.5.3.11.A.3.

### 5.5.6.11.B Other Protected Species

**Conclusion (including Mitigation).** There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.B. Therefore, there will be minor cumulative adverse impacts to OPS from this alternative, however there will be no significant cumulative effects.

### 5.5.6.11.C Wetlands

**Conclusion (including Mitigation).** There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.C. Therefore, there will be minor cumulative adverse impacts to wetlands from this alternative, however there will be no significant cumulative effects.

### 5.5.6.11.D Aquatic Resource

**Conclusion (including Mitigation).** There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.D. Therefore, there will be minor cumulative adverse impacts to aquatic resources from this alternative, however there will be no significant cumulative effects.

### 5.5.6.11.E Terrestrial Resources

**Conclusion (including Mitigation).** There are minor differences in the degree of impacts between the Army's Proposed Action with the Army's Proposed Land Use and Facility Plan and this alternative. Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions, will have an equivalent level of cumulative impacts as those discussed in subsection 5.5.3.11.E. Therefore, there will be minor cumulative adverse impacts to terrestrial resources from this alternative, however there will be no significant cumulative effects.

### 5.5.6.12 Cultural Resources

As discussed in subsections 5.5.3.12, Phase 1 archaeological surveys have been conducted at all of the locations where BRAC related training and construction activities will occur on FLW. Current implementation plans do not include the alteration, renovation, or demolition of any historic buildings or structures, and activities will not impact any of the known NRHP eligible cultural resources. Training activities are conducted in accordance with FLW Regulation 210-14 and if during training exercises archaeological materials are identified, then training will be stopped and the FLW archaeologist will be contacted for instructions. Because there are no impacts on cultural resources associated with the proposed training and construction actions, the proposed action will not contribute to the cumulative effects of past, present, or reasonably foreseeable future actions in the analysis area.

### 5.5.6.13 Sociological Environment

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.13.1 will result in the same cumulative impacts as are discussed in subsection 5.5.5.13.2. Conclusions and mitigation measures under this alternative are the same as those described in subsection 5.5.3.13.3.

### 5.5.6.14 Economic Development

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.14.1 will result in the same cumulative impacts as those described in subsection 5.5.5.14.2. Conclusions and mitigation measures under this alternative are the same as those described in subsection 5.5.3.14.3.

### 5.5.6.15 Quality of Life

### 5.5.6.15.A Quality of Life

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.15.A.2 will result in the same cumulative impacts as are discussed in subsection 5.5.3.15.A.2. No mitigation is necessary.

### 5.5.6.15.B Quality of Life (Human Health and Safety)

**Conclusion (including Mitigation).** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.15.B, will result in the same cumulative impacts discussed at subsection 5.5.3.15.B.2. As discussed at subsection 5.5.3.15.3, there are no adverse cumulative human health impacts anticipated from obscurant training with fog oil, training with toxic agents at the CDTF, and FFE deterrents training when conducted in accordance with Army guidelines. No mitigation is necessary.

### 5.5.6.16 Installation Agreements

As discussed in subsection 5.5.3.16 implementation of the phased relocation of personnel to FLW will result in a requirement to develop new Intraservice and Interservice Support Agreements among the various components operation at FLW. No impacts are expected to occur as a result of the development of these new agreements, and the new agreements would be based on current FLW agreements that are similar in scope and nature. The current agreements specify that environmental compliance, and management and disposal of hazardous waste will be conducted in accordance with the FLW Hazardous Waste Management Plan, FLW 220-01, AR 200-1, AR 200-2 and all Federal, state and local environmental laws and regulations. Because there are no impacts on installation agreements associated with the proposed training and construction actions, the proposed action will not contribute to the cumulative effects of past, present, or future actions in the analysis area.

### 5.5.6.17 Operational Efficiency

**5.5.6.17.1 EPTM, Alternative 1 Land Use Plan and Phased Population Move.** Implementation of the training and land use elements of this alternative, in combination with the past and present actions, and reasonably foreseeable future actions identified in subsection 5.5.3.17.1 within the analysis area will result in the following cumulative impacts.

- Determination of the training methods which will be employed to support the training activities associated with the US Army Chemical School and the US Army Military Police School, including the selection and implementation of the EPTM Alternative training method; and
- Redesignation of land use and training areas to meet changing mission requirements as called for in the Alternative 1 Land Use and Facility Plan (Combined Headquarters) including the construction of BRAC related construction projects as part of the proposed action.

**5.5.6.17.2 Conclusion (including Mitigation).** After reviewing the differential direct and indirect effects associated with implementing this alternative, the potential for the collocation and consolidation of the three schools (and the associated potential for positive synergistic effects) will be much lower for this alternative than those offered by the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction). The full potential for positive, synergistic effects and interaction is limited by the location of the instruction facilities away from the headquarters.

Additionally, the training effectiveness from using the EPTM Alternative, when compared to the OPTM Alternative, will reduce training realism based on reduce training time in the field. Specifically, the EPTM Alternative would decrease effectiveness in training for six training goals when compared to the OPTM

Alternative. This reduction in important field training for chemical soldiers does not provide a soldier that is as highly trained as the OPTM Alternative would.

# SUBSECTION 5.5.7

# Cumulative Impacts Summary

## Figure 5.1
## Environmental Impact Analysis Process Summary

**1. Subsection 5.1 - Introduction (See text subsection 5.1.2 for discussion of this process chart.)**

| STEP 1 - TRAINING ANALYSIS | STEP 2 - FACILITIES ANALYSIS | STEP 3 - POPULATION | STEP 4 - CUMULATIVE IMPACTS & MITIGATION |
|---|---|---|---|
| **2. Subsection 5.2.1 - Analysis of No Action Training Alternative**<br>Narrative Discussion (Not Viable) | **7. Subsection 5.3.1 - Analysis of No Action LU & Fac Plan**<br>Narrative Discussion (Not Viable) | **12. Subsection 5.4.1 - No Action (Population)**<br>Narrative Discussion (Not Viable) | **14. Subsection 5.5.3 - Evaluates: Army's Proposed Training (OPTM), Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **3. Subsection 5.2.2 - Analysis of Training Alternatives in Association with the Army's Proposed LU & Fac Plan (Combined Headquarters (HQ) & Instruction)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.20, Impact Matrix 1 (Volume II) | **8. Subsection 5.3.2 - Analysis of Army's Proposed LU & Fac Plan (Combined HQ & Instruction)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5-32, Impact Matrix 4 (Volume II) | **13. Subsection 5.4.2 - Phased Move Alternative (Only Viable Option)**<br>**Impact Analysis Elements:** Narrative Discussion | **15. Subsection 5.5.4 - Evaluates: EPTM Training, Army's Proposed LU & Fac Plan (Comb. HQ & Inst.), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **4. Subsection 5.2.3 - Analysis of Training Alternatives in Association with Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.21, Impact Matrix 2 (Volume II) | **9. Subsection 5.3.3 - Analysis of Alternative 1 LU & Fac Plan (Combined HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.33, Impact Matrix 5 (Volume II) | | **16. Subsection 5.5.5 - Evaluates: Army's Proposed Training (OPTM), Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **5. Subsection 5.2.4 - Analysis of Training Alternatives in Association with Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Training Alternatives:** RCP Alternative → OPTM Alternative (Army's Proposed) → EPTM Alternative<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.22, Impact Matrix 3 (Volume II) | **10. Subsection 5.3.4 - Analysis of Alternative 2 LU & Fac Plan (Separate HQ)**<br>**Impact Analysis Elements:** Narrative Discussion, Summary Table 5.34, Impact Matrix 6 (Volume II) | | **17. Subsection 5.5.6 - Evaluates: EPTM Training, Alternative 1 LU & Fac Plan (Combined HQ), and Phased Move**<br>**Impact Analysis:** Narrative Discussion |
| **6. Subsection 5.2.5 - Step 1 Summary**<br>Narrative Summary of Step 1 Training Analysis<br>**Conclusion** - RCP Alternative was Eliminated from Further Consideration. | **11. Subsection 5.3.5 - Step 2 Summary**<br>Narrative Summary of Step 2 Land Use and Facilities Analysis<br>**Conclusion** - Alternative 2 LU & Fac Plan (Separate HQ) was Eliminated from Further Consideration. | | **18. Subsection 5.5.7 - Step 4 Summary, Conclusions & Mitigation**<br>Narrative Discussion and Summary Table Including Mitigation Actions<br>**Conclusion** - Recommended Implementation of Army's Proposed Action of All Elements (See Item 14 above) |

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## 5.5.7 CUMULATIVE IMPACTS SUMMARY

This section summarizes the cumulative impacts associated with implementing each of the four reasonable implementation combinations of training, land use and facility plans, and population alternatives that have been analyzed in Steps 1 through 4, which included:

Step 1, Training Method Analysis;
Step 2, Land Use and Facility Plan Analysis;
Step 3, Movement of Personnel Analysis; and
Step 4, Cumulative Impacts Analysis.

As a result of the impact analysis in subsections 5.2, 5.3, and 5.4 the four reasonable implementation alternatives analyzed in the cumulative analysis (subsections 5.5.3 to 5.5.6) included:

1) Optimum Training Method (OPTM) Alternative; with the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) and the Phased Population Move Alternative;

2) Environmentally Preferred Training Method (EPTM) Alternative; with the Ar my's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) and the Phased Population Move Alternative;

3) Optimum Training Method (OPTM) Alternative; with the Alternative 1 Land Use and Facility Plan (Combined Headquarters ) and the Phased Population Move Alternative; and

4) Environmentally Preferred Training Method (EPTM) Alternative; with the Alternative 1 Land Use and Facility Plan (Combined Headquarters) and the Phased Move Alternative.

The cumulative impacts analysis was based on the review of the impacts associated with the proposed action while taking into consideration the impacts associated with past and present actions, and reasonably foreseeable future actions. The analysis was based upon each of the resources categories used in Section 4 to define the existing environment and the impacts of the proposed action in Section 5. For each of the resource categories, an analysis area was defined that allowed for the review of impacts associated with the individual resources. For most of the resources categories, the resource analysis area was contained within the installation boundary. Resource categories which include analysis areas that extended beyond the installation boundary included the following:

- Land Use and Training Areas, which included areas within a quarter-mile of the installation boundary;
- Air Quality and Climate, which included emissions sources within a 14-kilometer radius from the center of the installation;
- Noise, which includes the installation boundary and those noise zone II and III areas that extend beyond the installation boundary;
- Water Resources (including Floodplains, Surface Water and Hydrogeology/Groundwater), which used the boundaries of the FLW reservation (plus Shanghai spring and Roubidoux spring for groundwater);
- Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources) which included differing analysis areas based upon the category of species; T & E Species used an analysis areas defined by the boundaries of the installation, at Great Spirit Cave, and at bald eagle nesting locations along the Gasconade River; OPS used an analysis area defined by the FLW installation and a one-mile analysis zone around the entire installation; Wetlands used an analysis area defined by the installation boundary; Aquatic Resources used an analysis area defined by installation boundary; and Terrestrial Resources uses an analysis area defined by the FLW installation and a one-mile analysis zone around the entire installation;
- Sociological Environment, which used the nine-county Region of Influence (ROI), with a more specific analysis of Pulaski County;

- Economic Development, which used the nine-county Region of Influence (ROI), with a more specific analysis of Pulaski County; and
- Quality of Life (including Human Health and Safety), which used public lands (FLW and Mark Twain National Forest) in Pulaski, Texas and Laclede Counties as the analysis area.

Table 5.60 provides a summary of the significant adverse impacts for the alternatives being considered and mitigation actions that the Army intends to implement to reduce or eliminate the impact. In addition, mitigation actions that will be implemented by the Army to address other adverse impacts (i.e., those adverse impacts that were not identified as significant based on consideration of individual elements of the action, or the cumulative impact of all BRAC actions and other past, present and reasonably foreseeable actions) are summarized as a note included at the bottom of Table 5.60. All mitigation committments will be documented in the Record of Decision.

**Table 5.60:**
**Comparison of Significant Impacts and Mitigation Associated with Cumulative Analysis Scenarios ***

| Resource Category | 1. Army's Proposed Training (OPTM) with Army's Proposed LU & FP and Phased Move (Scenario 1) | 2. EPTM Training with Army's Proposed LU & FP and Phased Move (Scenario 2) | 3. Army's Proposed Training (OPTM) with Alt. 1 LU & FP & Phased Move (Scenario 3) | 4. EPTM Training with Alt. 1 LU & FP & Phased Move (Scenario 4) |
|---|---|---|---|---|
| Land Use | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Air Quality | **Significant Adverse Impact**<br><br>Annual amount of fog oil to maximum of 84,500 gallons. Annual PM-10 levels relating to this alternative are within NAAQS standards. However, still anticipate *significant adverse* impact on air quality (exceedance of NAAQS standard for 24-hr PM-10) associated with fog oil training using up to 1,200 gallons per day.<br><br>**Mitigation:**<br><br>The Army will mitigate air quality impacts to non-significant levels by:<br><br>1. Adhering to annual and daily use levels specified in the existing air permit (65,000 gallons per year and Approx. 481 gallons per day).<br><br>2. Complying with all other terms & conditions of existing air permit (see App. J), including air monitoring (see App. K).<br><br>As discussed in subsection 5.5.3.3.3, the Army intends to pursue a revised air permit with MDNR after further evaluation of the assumptions used for dispersion modeling. | **Significant Adverse Impact**<br><br>Annual amount of fog oil up to 49,500 gallons. Annual PM-10 levels relating to this alternative are within NAAQS standards. However, still anticipate *significant adverse* impact on air quality (exceedance of NAAQS standard for 24-hr PM-10) associated with fog oil training using up to 1,200 gallons per day.<br><br>**Mitigation:**<br><br>Mitigation requirements would be similar to those identified under Scenario 1 since the exceedance of significance thresholds is associated with the daily maximum fog oil use levels that are the same for all alternatives. | **Significant Adverse Impact**<br><br>Same as Scenario 1.<br><br>**Mitigation:**<br><br>Same as comment under Scenario 2. | **Significant Adverse Impact**<br><br>Same as Scenario 2.<br><br>**Mitigation:**<br><br>Same as comment under Scenario 2. |
| Noise | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Surface Water | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |

**Table 5.60:**
**Comparison of Significant Impacts and Mitigation Associated with Cumulative Analysis Scenarios ***

| Resource Category | 1. Army's Proposed Training (OPTM) with Army's Proposed LU & FP and Phased Move (Scenario 1) | 2. EPTM Training with Army's Proposed LU & FP and Phased Move (Scenario 2) | 3. Army's Proposed Training (OPTM) with Alt. 1 LU & FP & Phased Move (Scenario 3) | 4. EPTM Training with Alt. 1 LU & FP & Phased Move (Scenario 4) |
|---|---|---|---|---|
| Ground Water | **Significant Adverse Impact**<br><br>Use of up to 22,550 gallons of fuel per year would reduce impacts to approximately 60% of those expected for RCP Alt., but would still result in *significant adverse* impact to groundwater and adverse impact to surface water and soil resources. (Alternative includes surface water controls.)<br><br>**Mitigation:**<br><br>1. Provide berms around site and retention ponds to control surface water flows (part of initial proposed action design).<br><br>2. Provide impervious liner under the soil at the training site to prevent migration of petroleum products into groundwater. | **Significant Adverse Impact**<br><br>Same as Scenario 1 - no reduction in quantity of fuel to be used.<br><br>**Mitigation:**<br><br>Same as Scenario 1. | **Significant Adverse Impact**<br><br>Same as Scenario 1 - no reduction in quantity of fuel to be used.<br><br>**Mitigation:**<br><br>Same as Scenario 1. | **Significant Adverse Impact**<br><br>Same as Scenario 1 - no reduction in quantity of fuel to be used.<br><br>**Mitigation:**<br><br>Same as Scenario 1. |
| Geology and Soils | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Infrastructure | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Hazardous / Toxic Materials | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Munitions | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Permits / Regulatory Authority | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |

**Table 5.60:**
**Comparison of Significant Impacts and Mitigation Associated with Cumulative Analysis Scenarios ***

| Resource Category | 1. Army's Proposed Training (OPTM) with Army's Proposed LU & FP and Phased Move (Scenario 1) | 2. EPTM Training with Army's Proposed LU & FP and Phased Move (Scenario 2) | 3. Army's Proposed Training (OPTM) with Alt. 1 LU & FP & Phased Move (Scenario 3) | 4. EPTM Training with Alt. 1 LU & FP & Phased Move (Scenario 4) |
|---|---|---|---|---|
| Biological Resources-Federal T & E Species | **Significant Impact**<br><br>Obscurant training, TPA grenades and smoke pot training, and planned construction projects result in *may affect* determination for Indiana bat, gray bat and bald eagle (which is classified as a *significant adverse* impact).<br><br>A Biological Opinion has been issued by the USFWS with an incidental take statement in response to the Army's Proposed Action.<br><br>**Mitigation (Conservation Measures):**<br><br>**1. Implementation of Reasonable and Prudent Measures that have been specified by USFWS.** (Based on implementation of RPMs, the USFWS determined that the proposed action will not jeopardize the continued survival of the three federally-listed species.)<br><br>2. Adhere to "project design features" specified as part of the proposed action to minimize impacts.<br><br>3. Prepare Endangered Species Management Plan.<br><br>4. Develop and implement biomonitoring plan (see Vol. III, Appendix K).<br><br>5. Establish bat management zones around Freeman Cave and landscape-scale forest management policy. | **Significant Impact**<br><br>This alternative would be expected to result in a *may affect* impact to T&E Species (which is classified as a *significant adverse* impact).<br><br>However, these impacts would be less than those associated with cumulative impact scenarios 1 and 3 that include OPTM training levels.<br><br>**Mitigation (Conservation Measures):**<br><br>Implementation of this alternative would require formal consultation with USFWS, issuance of a Biological Opinion, and **implementation of Reasonable and Prudent Measures specified by USFWS.**<br><br>The total mitigation requirement would be expected to be somewhat less restrictive than to those defined in detail for Scenario 1. | **Significant Impact**<br><br>The degree of impacts anticipated would be directly comparable to Scenario 1, although the specific locations of these impacts would vary under this alternative.<br><br>**Mitigation (Conservation Measures):**<br><br>Same as Scenario 2. | **Significant Impact**<br><br>Same as Scenario 2.<br><br>**Mitigation (Conservation Measures):**<br><br>**Same as Scenario 2.** |
| Other Protected Species | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Wetlands | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Aquatic Resources | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |

**Table 5.60:**
**Comparison of Significant Impacts and Mitigation Associated with Cumulative Analysis Scenarios ***

| Resource Category | 1. Army's Proposed Training (OPTM) with Army's Proposed LU & FP and Phased Move (Scenario 1) | 2. EPTM Training with Army's Proposed LU & FP and Phased Move (Scenario 2) | 3. Army's Proposed Training (OPTM) with Alt. 1 LU & FP & Phased Move (Scenario 3) | 4. EPTM Training with Alt. 1 LU & FP & Phased Move (Scenario 4) |
|---|---|---|---|---|
| Terrestrial Resources | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Cultural Resources | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Sociological Environment | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Economic Development | Significant Positive Economic Impact to Region. | Significant Positive Economic Impact to Region. No appreciable difference in degree of impact versus Scenario 1. | Same as Scenario 1. | Same as Scenario 2. |
| Quality of Life | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Human Health | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Installation Agreements | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |
| Operation Efficiency | No Significant Impact | No Significant Impact | No Significant Impact | No Significant Impact |

Note: * In addition to the mitigation measures noted above, FLW will implement or continue to adhere to the following protective measures that address adverse impacts to other resource categories and ensure that impacts of the planned actions are consistent with those predicted in this EIS:
1). Implementation of Project Design Features; 2) Adherance to Best Management Practices; 3) Continuation of Ongoing Resource Management and Restoration Programs; 4) Continued Compliance with Other (Non-BRAC) Permit Requirements; 5) Completion and Implementation of Six BRAC-Related Monitoring Programs (and Associated Adaptive Management Strategies) as described in Vol. III, Appendix K; and 6) Completion and Implementation of the Public Awareness Program as described in Vol. III, Appendix L..

*Source: Harland Bartholomew & Associates, Inc*

**Other Impacts.** As described in subsections 5.5.3 to 5.5.6, there are beneficial impacts for operational efficiency, training effectiveness and economic activity that would result from the implementation of each of the four alternatives. Likewise, there are adverse impacts associated with each of the alternatives that were not categorized as significant adverse impacts and therefore not included in the table 5.60. Mitigation actions for the adverse impacts identified as result of the cumulative analysis are presented in each of the appropriate resource categories within subsections 5.5.3 to 5.5.6, and are summarized in the note included at the end of Table 5-60.

**Selection of the Preferred Alternative.** In accordance with the President's Council on Environmental Quality regulations (40 CFR 1502.14), this Final EIS identifies the Army's Preferred Alternative for implementing the Proposed Action. The rationale for the selection of a Preferred Action is summarized below.

The impact analysis revealed that the environmental impacts of the Alternative 2 Land Use and Facility Plan (LU&FP) were clearly more adverse than either the Army's Proposed LU&FP or the Alternative 1 LU&FP. Therefore, the Alternative 2 LU&FP was eliminated from further consideration as part of the "Step 5" cumulative impact analysis. The analysis also showed that the Army's Proposed LU&FP has less overall adverse environmental impacts, and results in considerably higher operational efficiency than the

Alternative 1 LU&FP. Therefore, the Army's Proposed LU&FP was favored for selection as part of the overall action implementation plan.

The impact analysis documents that the Relocate Current Practice (RCP) training alternative would result in substantially higher adverse environmental impacts (taken as a whole) than either the Army's Proposed (OPTM) Alternative, or the EPTM Alternative. Therefore, the RCP Alternative was eliminated from further consideration as part of the "Step 5" cumulative impact analysis.

The analysis indicates that selection of the EPTM Training Alternative would reduce the annual quantify of fog oil to be used, thereby reducing the extent of impacts on the environment (including some reduction in the degree of impact to air quality and threatened and endangered species). However, significant adverse impacts to both air quality and threatened and endangered species would still occur as a result of the provision under each alternative to use up to 1,200 gallons of fog oil on peak training days; and the nature and extent of mitigation under the OPTM and EPTM alternatives are very similar. However, the implementation of the EPTM Alternative would noticeably reduce the overall training effectiveness in six of the 43 training goals (see subsection 5.2.2.17.1.2).

The most significant reduction in training effectiveness under the EPTM Alternative would be associated with TG 7.4 (Fog Oil Training Field Proficiency Test), where the reduced levels of fog oil usage would not provide soldiers that are as highly trained under realistic field conditions as the OPTM Alternative provides. Furthermore, proficiency in deployment and maintenance of smoke screen cover over specified areas under battlefield conditions is considered to be critically important to perform successful military missions and to protect our troops and defend our national interests and those of our allies.

Based on consideration of these conclusions, in association with all other information presented in the Final EIS, the Army's Preferred Action is defined as:

- implementation of the **Optimum Training Method (OPTM) Alternative** to support activities associated with the Military Police School and the Chemical School;

- implementation of the **Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction)** which includes providing facilities (buildings, specialized training facilities and designated training land areas) to meet the training needs of the Military Police School and the Chemical School, and the needs of additional personnel to be realigned to the installation, through a combination of:
    - reuse or additional use of existing facilities in their present condition;
    - alteration of existing facilities to make them suitable for new uses or activities;
    - construction of new facilities; and
    - rental or purchase of family housing in the local community by individual service members; and

- the **Phased Move** of personnel tied to the availability of facilities.

This Preferred Action is consistent with the actions evaluated under cumulative impact analysis "Scenario 1" as described above. The Preferred Action will be implemented in accordance with the mitigation actions summarized in Table 5.60 above.

# Section 6
# LIST OF PREPARERS

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## SECTION 6: LIST OF PREPARERS


6.1 HARLAND BARTHOLOMEW & ASSOCIATES, INC. / PARSONS ENGINEERING SCIENCE, INC. ..... 6-1

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# Section 6: List of Preparers

This EIS was prepared under the direction of the U.S. Department of the Army, Training and Doctrine Command; and the U.S. Army Corps of Engineers, Kansas City District. A list of persons who participated in the preparation of this document is presented below.

## 6.1 HARLAND BARTHOLOMEW & ASSOCIATES, INC. / PARSONS ENGINEERING SCIENCE, INC.

| Name | Education and Experience | Primary Responsibilities |
|---|---|---|
| Robert B. Bax | B.S. Forestry; M.S. Recreation & Park Administration; 20 years experience in environmental, urban/regional, recreation and military planning projects. | Project Manager; planning and general supervision of all work elements. |
| Gregory W. Knauer | B.A. Zoology; M.S. Aquatic Ecology; 20 years experience in environmental planning, water quality investigation, and military master planning projects. | Assistant Project Manager/Principal Scientist; coordination of technical elements and analysis; coordination and review of support studies. |
| Donald E. Beisel | B.S. Geography; M.A. Geography; 23 years of experience in community/urban planning, environmental planning, and socioeconomic studies. | Senior Project Planner; data collection and preparation of socioeconomic analysis and related text sections including EIFS model forecasts. |
| Michael D. Bumgardner | B.S. Zoology; 8 years of experience in environmental studies and planning, particularly endangered species assessment and management. | Environmental Planner; preparation of Appendix K - Summary of Monitoring Programs. |
| William L. Bradford | B.S. Biology (Zoology); M.S. Insecticide Toxicology; 15 years of experience in mammalian toxicology, pharmacokinetics, and human health risk assessments. | Senior Human Health Risk Scientist; calculated human health risks from fog oil exposures; key participant in preparation fog oil human health risk assessment study. |

| Name | Education and Experience | Primary Responsibilities |
|---|---|---|
| Bruce A. Cox | B.S. Biology/Chemistry; M.S. Marine Biology; Ph.D. Environmental Toxicology; 25 years experience with environmental toxicology and environmental compliance programs. | Principal Scientist; data collection/analysis, and preparation of human health risk assessment and related text sections. |
| Rebecca L. Cropper | B.A. Physics; M.S. Health Physics; 17 years experience in health physics, radioactive waste management, radiological engineering and licensing. | Senior Scientist; assisted with preparation and technical review of radioactive materials text and related appendix sections. |
| Daniel W. Currence | B.S., Civil Engineering; M.S., Environmental Engineering; 9 years of civil and environmental engineering experience on hazardous waste sites. | Senior Project Engineer; data collection/preparation of infrastructure and hazardous and toxic materials analysis and related sections. |
| Robert P. DeMott | B.A., Biology; Ph.D. Physiological Science (Physiology); 8 years experience in mammalian physiology, and human health risk assessments. | Senior Scientist, Human Health Risk Assessments; technical review of the fog oil human health risk assessment. |
| Luke F. Eggering | B.S., Fish and Wildlife Management; M.S., Biology; 8 years experience in wetland management; wildlife, fisheries and endangered species management; preparation of environmental documents. | Environmental Scientist; data collection, analysis and key participant in preparation of EIS text and supporting sections relating to biological resources, specializing in aquatic ecosystems. |
| Molly S. Enloe | B.S., Environmental Science and Systematic Biology; 7 years of experience in environmental planning, wildlife/habitat assessment and endangered species management. | Environmental Planner; preparation of Appendix K - Summary of Monitoring Programs. |
| Gina M. Gansmann | B.S., Civil Engineering; 2 years experience in water resources, environmental engineering, and environmental document preparation. | Associate Planner; data collection, and assisted in preparation of surface water section and infrastructure and hazardous and toxic materials analysis and related sections. |
| James A. Garrison | B.S., Agricultural Engineering; M.S., Environmental Engineering; 20 years experience in air quality, regulatory analysis and air permitting, water quality, and hazardous waste. | Environmental Scientist; technical assistance for the development and review of air quality analysis. |
| Lee L. Gorday | B.A., Geology; M.A. Geology; 14 years of experience in hydrogeologic systems and groundwater contamination. | Senior Hydrogeologist; data collection and preparation of groundwater, geology, and soils elements. |

| Name | Education and Experience | Primary Responsibilities |
|---|---|---|
| Mike R. Grimm | B.S., Chemical Engineering; M.S., Chemical Engineering; 4 years experience in preparation of environmental documents, air emission inventories and permitting, regulatory compliance, and hazardous waste minimization. | Environmental Scientist; data collection and key participant in the preparation of air quality and climate analysis. |
| Edward F. Krohn | B.S. Chemical Engineering; M.E. Chemical Engineering; 16 years experience in process and mechanical design and systems engineering, including chemical weapons destruction. | Senior Systems Engineer; assisted in analysis of mechanical systems and other issues related to the disposal of decontaminated wastes generated by the CDTF. |
| David E. Mizell | M.S. Systems and Control Engineering; 21 years of experience in environmental studies, engineering design and site remediation projects. | Senior Environmental Engineer; data analysis and key participant in preparation of hazardous waste management and solid waste management elements of the EIS. |
| Brian D. Moreth | B.S. Zoology; B.S. Forest Science; 25 years experience in natural resource, environmental assessment and regulatory compliance studies. | Senior Environmental Scientist; data collection and key participant in preparation of hazardous materials and permitting sections of the EIS. |
| Stephen E. Noren | B.S. Physics; 26 years experience in environmental assessments and compliance, and human health risk assessments. | Risk Assessment Technical Coordinator; provided technical review and comments on fog oil human health risk assessment. |
| Randy D. Norris | B.S. Plant and Soil Science; Master of Urban Planning/ Environmental Planning; 6 years experience in environmental impact assessment, environmental management and planning. | Environmental Planner; data collection, preparation of quality of life and installation agreements analysis, and assisted in land use, noise, hazardous/toxic materials, new mission and alternatives analysis. |
| Thomas G. Plattner | B.S. Biology; M.S. Environmental Studies; 6 years experience in hazardous waste investigation/remediation and environmental assessment of natural resources. | Environmental Scientist; data collection and participated in preparation of biological resources elements of the EIS. |
| Amy M. Schuster | B.A.. Architectural Studies; Master of Urban Planning; over 2 years experience in various aspects of urban planning. | Urban Planner, data collection and coordination of public affairs and public coordination issues. |

| Name | Education and Experience | Primary Responsibilities |
|---|---|---|
| Darrel B. Sisk, Jr. | B.E.D. Environmental Design; M.S. Architectural Engineering; 14 years experience in base civil engineering, military planning and environmental planning and impact assessment. | Senior Project Planner; data collection and key participant in description of proposed action, alternatives formulation, new mission analysis, and training, facilities, and land use alternatives and related environmental analysis. |

## 6.2 3D/ENVIRONMENTAL

| Name | Education and Experience | Primary Responsibilities |
|---|---|---|
| Virgil W. Brack, Jr. | B.S. in Wildlife Science; M.S. in Physiological Ecology; Ph. D in Wildlife Ecology. Secondary author of literature summary and Habitat Suitability Index, Components of Summer Habitat for Indiana bat, *Myotis sodalis.* U.S. Fish and Wildlife Service Bat Recovery Team member. | Project Administrator; coordination of all work elements involved in the Biological Assessment and analysis of the potential impacts on threatened and endangered species. |
| Karen Tyrell | B.S. in Zoology; Ph.D. in Biology; over 12 years experience in endangered species impact analysis and 13 years experience in bat research. Secondary author of literature summary and Habitat Suitability Index, Components of Summer Habitat for Indiana bat, *Myotis sodalis.* U.S. Fish and Wildlife Service Bat Recovery Team consultant. | Project Administrator; coordination of all work elements involved in the Biological Assessment and analysis of the potential impacts on Indiana bat, gray bat and American bald eagle species. Key participant in preparation of EIS text sections relating to impacts on threatened and endangered species. |
| Russ C. Rommé | B.S., Wildlife Management and Natural Resources; 11 years experience with endangered species and habitat management. Primary author of literature summary and Habitat Suitability Index, Components of Summer Habitat for Indiana bat, *Myotis sodalis.* | Project Manager; planning and direction of all work elements involved in the Biological Assessment and analysis of the potential impacts on threatened and endangered species. |
| Adam T. Black | B.S., Wildlife Science; 5 years experience with wildlife management and endangered species habitat evaluation. | Environmental Scientist; data collection and completion of the HEP analysis; effects of habitat degradation resulting from BRAC-related construction. |
| W. Mike Farmer | B.S. in Engineering Physics; M.S. in Physics; Ph. D. in Physics; 25 years experience in atmospheric physics and measurement of aerosols. Developed the Tactical Resources Evaluation Modeling System, Module 1 (TREMS 1) air dispersion model for military fog oil use. | Senior Environmental Scientist; data collection and completion of air modeling analysis in support of the Biological Assessment analysis of fog oil usage. |

| Name | Education and Experience | Primary Responsibilities |
|---|---|---|
| Robert F. Madej | B.S. in Zoology; M.S. Ecology and Evolutionary Biology; 4 years experience with endangered species. | Environmental Scientist; effects of construction and training-generated sound and vibration on bald eagles, Indiana bats, and gray bats. |
| Richard P. Reaves | B.S. in Wildlife Ecology and Resource Management; Ph. D. Wildlife and Wetlands Ecology; 5 years experience in wildlife habitat evaluation. | Senior Environmental Scientist; effects of habitat degradation resulting from BRAC-related construction. |
| Angela C. Schmidt | B.A. in Biology/Chemistry; M.S. Aquatic Biology; 15 years experience in environmental chemistry | Senior Environmental Scientist; data collection and analysis of potential impacts on biological resources and ecosystems with respect to hazardous and toxic materials. |

### 6.3 AMERICAN RESOURCES GROUP, LTD.

| Name | Education and Experience | Primary Responsibilities |
|---|---|---|
| Michael J. McNerney | B.A. Business Administration; M.A. Anthropology; 22 years of experience in cultural resource management and serving as Principal Investigator for wide range of historic and prehistoric archeological investigations and studies. | Principal Investigator; preparation of cultural resource affected environment and environmental consequences sections of the EIS. |

### 6.4 BURNS & McDONNELL

| Name | Education and Experience | Primary Responsibilities |
|---|---|---|
| Block M. Andrews | B.S. Mechanical Engineering; M.S. Meteorology. 7 years experience in air quality assessment, including air dispersion modeling and PSD permitting. | Senior Air Quality Specialist; key participant in preparation of air quality analysis and related sections of the EIS. |
| Mark I. Saito | B.S. Meteorology; M.S. Environmental Studies; 10 years experience operational weather forecasting and 1 year experience in air dispersion modeling, and construction permit applications. | Staff Air Pollution Specialist. Data analysis for air dispersion modeling, and analysis of weather forecast parameters for obscurant training. |

# Section 7
# DISTRIBUTION LIST

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# Section 7: Distribution List

## 7.1 INTRODUCTION

This section identifies Federal, state and local agencies; elected officials; organizations; and individuals that received a copy of the Draft EIS. In addition, agencies, organizations and individuals that provided substantive comments on the Draft EIS (or that specifically requested a copy of the Final EIS) were provided with a copy of the Final EIS concurrent with the publication of a Notice of Availability in the *Federal Register*. Those entities that received a copy of the Final EIS have been indicated with an asterisk (*) in the list below. The Final EIS (and major supporting documents) have also been provided to each of the eleven public repositories listed at the end of this Section and in subsection 1.4.6.3.

## 7.2 FEDERAL AGENCIES

Mr. Don L. Klima, Executive Director
Advisory Council on Historic Preservation
Old Post Office Bldg, Suite 809
100 Pennsylvania Ave., NW
Washington, D.C. 20004

Regional Administrator
Department of Health & Human Services
601 E. 12th Street, Room 384
Kansas City, Missouri 64106

Mr. Al Kemp
Regional Director
Department of Health & Human Services
601 East 12th Street, Room 210
Kansas City, Missouri 64106

Mr. D. J. Tisor
Regional Director
Federal Railroad Administration
City Center Square, Suite 1130
1100 Main Street
Kansas City, Missouri 64105-2112

Director - Midwest Region
National Park Service
1709 Jackson Street
Omaha, Nebraska 68182

Mr. Bruce Thompson
Natural Resources Conservation Service
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601 Business Loop 70 West
Columbia, Missouri 65203

Director
Office of Environmental Project Review
U.S. Department of Interior
1849 "C" Street, NW, Room 2340
Washington, D.C. 20260

Mr. Gerald Simpson
Regional Administrator
Department of Housing & Urban Development
1103 Grand Avenue
Kansas City, Missouri 64106

Mr. S.R. Mellinger
Regional Director
Federal Emergency Management Agency
911 Walnut Street
Kansas City, Missouri 64106

Mr. Floyd Marita,
Regional Forester
310 West Wisconsin Avenue
Milwaukee, Wisconsin 53203

Mr. Gary Schmidgall
U.S. Department of Agriculture
Mark Twain National Forest
401 Fairgrounds Road
Rolla, Missouri 65401

* Mr. Jake Joyce, ATSDR
U.S. Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

* Ms. Cathryn E. Tortorici
Project Manager
U.S. Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

* Mr. Mike LeValley
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Columbia Field Office
608 East Cherry Street
Columbia, Missouri 65201

U.S. Geological Survey
Water Resources Division
U.S. Department of Interior
P.O. Box 340
Rolla, Missouri 65401

* Mark Hamel
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Mark Twain National Forest
Houston-Rolla Ranger District
108 S. Sam Houston Blvd.
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U.S. Department of the Interior
Office of the Secretary
Office of Environmental Policy and Compliance
Denver Federal Center, Building 56, Room 1003
P.O. Box 25007 (D-108)
Denver, Colorado 80225-0007

US Environmental Protection Agency
Region VI (Attn: Mr Reedy)
100 Alabama Avenue
Atlanta Federal Center
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## 7.3 STATE AGENCIES

* Mr. Dan Dickneite
Planning Division Chief
Missouri Department of Conservation
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* Mr. David Shorr, Director
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Ms. Lois Pohl
Coordinator Missouri Clearinghouse
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## 7.4 LOCAL AND REGIONAL AGENCIES

Ms. June Franklin
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* Ms. Elizabeth Bax
Executive Director
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Hoge Hall (Bldg 3200)
Fort Leonard Wood, Missouri 65473

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## 7.5 ELECTED OFFICIALS

The Honorable Mel Carnahan
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Jefferson City, Missouri 65101

The Honorable John Ashcroft
United States Senator
246 Russell Senate Office Building
Washington, D.C. 20510

The Honorable Christopher Bond
United States Senator
293 Russell Senate Office Building
Washington, D.C. 20510

Staff Representative
United States Representative
2454 Rayburn Building
Washington, D.C. 20515

The Honorable Mel Hancock
United States Representative
1024 Longworth Building
Washington, D.C. 20515

The Honorable Ike Skelton
United States Representative
2227 Rayburn Building
Washington, D.C. 20515

The Honorable Larry Rohrbach
State Senator, 6th. District
State Capitol Building
Room 434
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The Honorable Mike Lybyer
State Senator, 16th. District
State Capitol Building
Room 333
Jefferson City, Missouri 65101

The Honorable Steve Ehlmann
State Senator, 23rd. District
State Capitol Building
Room 429
Jefferson City, Missouri 65101

The Honorable John Russell
State Senator, 33rd. District
State Capitol Building
Room 419
Jefferson City, Missouri 65101

The Honorable John Griesheimier
State Representative, 110th. District
State Capitol Building
Room 106A
Jefferson City, Missouri 65101

The Honorable James Froelker
State Representative, 111th. District
State Capitol Building
Room 135BA
Jefferson City, Missouri 65101

The Honorable Bill Gratz
State Representative, 113th. District
State Capitol Building
Room 206C
Jefferson City, Missouri 65101

The Honorable Carl Vogel
State Representative, 114th. District
State Capitol Building
Room 116-2
Jefferson City, Missouri 65101

The Honorable Jim Kreider
State Representative, 142nd. District
State Capitol Building
Room 114A
Jefferson City, Missouri 65101

The Honorable Estel Robirds
State Representative, 143rd. District
State Capitol Building
Room 103BA
Jefferson City, Missouri 65101

The Honorable Mary Lou Sallee
State Representative, 144th. District
State Capitol Building
Room 115J
Jefferson City, Missouri 65101

The Honorable Beth Long
State Representative, 146th. District
22975 Oneida Drive
Lebanon, Missouri 65536

The Honorable Bill Ransdall
State Representative, 148th District
State Capitol Building
Jefferson City, Missouri 65101

The Honorable Jerry McBride
State Representative, 149th. District
State Capitol Building
Room 411B
Jefferson City, Missouri 65101

The Honorable Ken Fiebelman
State Representative, 150th. District
State Capitol Building
Room 311
Jefferson City, Missouri 65101

The Honorable Kay Cyrus
Mayor of Camdenton
P.O. Box 1048
Camdenton, Missouri 65020

The Honorable Norma Lea Mihalevich
Mayor of Crocker
P.O. Box 116
Crocker, Missouri 65452

The Honorable John Thilges
Mayor of Dixon
303 South Elm Street
P.O. Box 177
Dixon, Missouri 65459

The Honorable Kim Wilson
Mayor of Edgar Springs
P.O. Box 13
Edgar Springs, Missouri 65462

The Honorable Edwin Goldsmith
Mayor of Houston
111 West Main Street
Houston, Missouri 65483

The Honorable Fred Schaffer
Mayor of Iberia
P.O. Box 211
Iberia, Missouri 65486

The Honorable Bud Pond
Mayor of Lebanon
400 S. Madison, Box 111
Lebanon, Missouri 65536

The Honorable Mark Rinne
Mayor of Licking
P.O. Box 64
Licking, Missouri 65542

The Honorable Duane Simms
Mayor of Newburg
2nd. & Main, Drawer K
Newburg, Missouri 65550

The Honorable Gary Martin
Mayor of Osage Beach
Lake Rd. 54-24, Rt. 3, Box 4775
Osage Beach, Missouri 65065

The Honorable Charles Parker
Mayor of Richland
P.O. Box 798
Richland, Missouri 65556

The Honorable Elwyn Wax
Mayor of Rolla
P.O. Box 979
Rolla, Missouri 65401

The Honorable C. Clark Leonard
Mayor of Salem
202 N. Washington
Salem, Missouri 65560

The Honorable Donald Scott
Mayor of St. Robert
P.O. Box 1156
St. Robert, Missouri 65583

The Honorable Nelson Hart
Mayor of St. James
P.O. Box 426
St. James, Missouri 65559

The Honorable Bob Knight
Mayor of Waynesville
201 North Street
Waynesville, Missouri 65583

Mr. Rick Wolken
Laclede County Commission
200 North Adams
Lebanon, Missouri 65536

Mr. Ralph Peterson
Presiding Commissioner
Pulaski County Commission
301 U.S. Hwy. 44 East, Suite 101
Waynesville, Missouri 65583

## 7.6 ORGANIZATIONS

* Coalition for the Environment
Attn: Mr. Roger Pryor
6267 Delmar Boulevard
University City, Missouri 63130

Conservation Federation of Missouri
Attn: Mr. Mark Van Patten
728 East Capitol Ave.
Jefferson City, Missouri 65101

* Heartwood
Attn: Mr. Devin Scherübel
P.O. Box 7653
Columbia, Missouri 65205

Missouri Cattleman's Association Headquarters
Attn: Jeff Windett
2100 East Broadway, Suite 200
Columbia, Missouri 65201

* Sierra Club, Ozark Chapter
Attn: Mr. Ken Midkiff
1005 Belview Court
Columbia, Missouri 65203

Student Environmental Action Coalition
Attn: Ms. Jillian Burchard & Mr. Eric Hempiel
P.O. Box 63232
St Louis, MO 63163

* Student Environmental Center
Attn: Ms. Kristen E. Kordecki
913 S. Illinois Avenue
Carbondale, IL 62901

Documents Department - KW
The Libraries
Colorado State University
Fort Collins, Colorado 80523-1091
ATTN: Fred C. Schmidt

## 7.7 INDIVIDUALS

* Mr. Paul Albertson
Department of Geological Engineering University of Missouri at Rolla
Rolla, Missouri 65409

Mr. Curt Anderson
2021 K Street
Suite 600
Washington, DC 20006

Mr. Jim Bensman
117 North Shamrock Street, Apt 1
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# Section 10
# PERSONS CONSULTED

# Section 10: Persons Consulted

| Name | Address | Telephone No. | Reason Contacted |
|---|---|---|---|
| Bernstein, Craig | U.S. Environmental Protection Agency<br>Region VII<br>727 Minnesota Avenue<br>Kansas City, Kansas 66101 | (913) 551-7688 | Agency coordination concerning the development and formulation of the Alternatives Analysis |
| Best, Troy | Auburn University<br>Dept. of Zoology and Wildlife Science<br>331 Funchess Hall<br>Auburn University<br>AL 36849-5414 | (334) 844-9260 | Provided information on effects to endangered species. |
| Boake, Dr. Chris | University of Tennessee<br>Knoxville, TN | (423) 974-2371 | Statistical design of studies to determine effects of sound on hibernating Indiana bats. |
| Bruenderman, Sue | Missouri Dept. of Conservation<br>1110 South College Avenue<br>Columbia, MO 65201 | (573) 882-9880 | Provided input concerning the FLW fishery. |
| Carlson, Glenn A. | Missouri Dept. of Natural Resources<br>Air Pollution Control Program<br>PO Box 167<br>Jefferson City, MO 65102 | (314) 751-4817 | Agency Coordination |
| Clawson, Rick | Missouri Dept. of Conservation<br>Fish & Wildlife Research Center<br>1110 College Avenue<br>Columbia, MO 65201 | (314) 882-9880 | Provided data on population counts of gray bats and Indiana bats on Fort Leonard Wood, and provided weight data for Indiana bats and gray bats for ecotoxicology analyses. |
| Collins, Steven | 2401 Double Branch Rd.<br>Columbia, TN 38401 | (615) 380-0210 | Provided information for and assisted in cave mapping. |
| Corbitt, Lynn | U.S. Dept. of Interior<br>Mark Twain Natl. Forest<br>Rolla, MO 65401 | (417) 967-4194 | Agency Coordination |
| Crawford, Todd | Missouri Dept. of Natural Resources<br>Jefferson City, MO 65102 | (314) 751-6892 | Agency Coordination |

| Name | Address | Telephone No. | Reason Contacted |
|---|---|---|---|
| Driver, Crystal J. | Battelle Pacific Northwest Labs<br>P.O. Box 999<br>Richland, WA 99352 | (509)375-2721 | Fog oil human health information. |
| Dunlap, Keith | 32 Troon Court<br>Greenwood, IN 46143 | (317) 242-2505 | Provided information for and assisted in cave mapping. |
| Dunn, Heidi L. | Ecological Specialists, Inc.<br>114 Alganna Court<br>St. Peters, MO 63376 | (314) 447-4101 | Provided information on freshwater mussels, benthic macroinvertebrates, and fish. |
| Figg, Dennis | Missouri Dept. of Conservation<br>PO Box 180<br>Jefferson City, MO 65102 | (314) 751-4115 | Permitting for endangered species work and reviewed the scope of work on hibernating Indiana bat studies. |
| Frazer, Gary | U.S. Fish & Wildlife Service<br>608 Cherry Street<br>Room 200<br>Columbia, MO 65201 | (314) 876-1911 | Cooperating Agency Point of Contact. |
| Furniss, Larry | U.S. Dept. of Interior<br>Mark Twain Natl. Forest<br>Rolla, MO 65401 | (314) 364-4501 | Provided information on the stream fishery near FLW. |
| Gardner, Gene | Missouri Hwy/Transp. Dept.<br>PO Box 270<br>Jefferson City, MO 65102 | (314) 526-5644 | Provided weight data on Indiana bats and gray bats for ecotoxicology analyses. |
| Gill, Charles | U.S. Forest Service<br>Mark Twain Natl. Forest<br>401 Fairgrounds Rd.<br>Rolla, MO 65401 | (314) 364-4621 | Agency Coordination |
| Gott, Jerry D. | U.S. Dept. of Interior<br>Mark Twain Natl. Forest<br>Rolla, MO 65401 | (314) 364-4621 | Agency Coordination |
| Gunn, Gene | U.S. Environmental Protection Agency<br>Region VII<br>727 Minnesota Avenue<br>Kansas City, Kansas 66101 | (913) 551-7435 | Agency Coordination |
| Hall, Richard | U.S. Forest Service<br>401 Fairgrounds Rd.<br>Rolla, MO 65401 | (314) 341-7404 | Agency Coordination |
| Hommel, Kathy | Burns and McDonnell<br>4800 East 63rd Street<br>Kansas City, MO 64130 | (816) 822-3455 | Air Quality Analysis and Modeling |
| Imes, Jeffery | U.S. Geological Survey<br>Rolla, MO 65401 | (573) 341-0831 | Agency Coordination |
| Johnson, Scott | Indiana Dept. of Natural Resources<br>553 East Miller Dr.<br>Bloomington, IN 47401 | (812) 334-1137 | Provided weight data for Indiana bats for ecotoxicology analyses, and permitting for collection of study animals for hibernating bat sound study. |
| Joyce, Jake | U.S. Environmental Protection Agency<br>Region VII<br>727 Minnesota Avenue<br>Kansas City, Kansas 66101 | (913) 551-7435 | Provided input related to human health effects of fog oil. |

| Name | Address | Telephone No. | Reason Contacted |
|---|---|---|---|
| Knott, DeWayne | U.S. Environmental Protection Agency<br>Region VII<br>727 Minnesota Avenue<br>Kansas City, Kansas 66101 | (913) 551-7299 | Agency Coordination |
| Kurta, Dr. Al | Eastern Michigan Univ.<br>Dept. of Biology<br>316 Mark Jefferson<br>Ypsilanti, MI 48197 | (313) 487-1174 | Provided information on effects to endangered bats; provided weight data for Indiana bats for ecotoxicology analyses; contributed statistical design for studies to determine effects of sound on hibernating bats. |
| Lamb, Jeff | Natural Resources Conservation Service<br>1460 A South Sam Houston Blvd.<br>Houston, MO 65483 | (417) 967-4188 | Agency Coordination |
| Lange, Tom | Missouri Dept. of Natural Resources<br>P.O. Box 176<br>Jefferson City, MO 65102 | (314) 751-3195 | Agency Coordination |
| LeValley, Mike | U.S. Fish & Wildlife Service<br>608 Cherry Street<br>Room 200<br>Columbia, MO 65201 | (314) 876-1911 | Cooperating Agency Point of Contact. Permitting of endangered species work; reviewed the study plan for the BA and participated in ongoing informal Section 7 consultation. |
| MacGregor, John | USFS, Daniel Boone National Forest<br>1700 Bypass Rd.<br>Winchester, KY 40391 | (606) 745-3100 | Provided weight data on Indiana bats and gray bats for ecotoxicology analyses. |
| Mandell, Lisa | U.S. Fish & Wildlife Service<br>Bishop Henry Wipple<br>Federal Building<br>1 Federal Drive<br>Ft. Snelling, MN 55111 | (612) 725-3536 | Permitting for endangered species work. |
| McGrath, Kathy | Missouri Dept. of Conservation<br>2901 West Truman Blvd.<br>Jefferson City, MO 65109 | (314) 751-4115 | Reviewed study plan to assess effects of environmental contaminants on birds, reptiles and amphibians. |
| Metker, Leroy W. | U.S. Army Environmental Hygiene Agency, Toxicology Division<br>Aberdeen Proving Grounds, MD<br>21010-5422 | (410) 671-3980 | Information on fog oil human health effects. |
| Mitchell, Doug | Burns and McDonnell<br>4800 East 63rd Street<br>Kansas City, MO 64130 | (816) 822-3455 | Air Quality Analysis and Modeling |
| Neff, Dr. Jerry M. | Battelle Ocean Science Lab<br>397 Washington St.<br>Duxbury, MA 02332-0601 | (617) 934-0571 | Hydrocarbon fate and effects. |
| Richards, Kevin | Missouri Dept. of Conservation<br>Rt. 2 Box 247<br>Camdenton, MO 65020 | (314) 346-2210 | Agency Coordination concerning the FLW fishery. |
| Rockers, Phil | Missouri Dept. of Conservation<br>2350 South Jefferson<br>Lebanon, MO 65536 | (417) 532-7612 | Provided information concerning the lake and impoundment fishery on FLW. |

| Name | Address | Telephone No. | Reason Contacted |
|---|---|---|---|
| Schmidgall, Gary | U.S. Dept. of Interior<br>Mark Twain Natl. Forest<br>Rolla, MO 65401 | (314) 341-7497 | Agency Coordination |
| Scholl, Bob | Burns and McDonnell<br>4800 East 63rd Street<br>Kansas City, MO 64130 | (816) 822-3154 | Air Quality Analysis and Modeling |
| Seibel, Dave | Missouri Dept. of Conservation<br>2350 South Jefferson<br>Lebanon, MO 65536 | (417) 532-7612 | Provided information concerning the stream fishery on FLW. |
| Sietman, Bernard E. | Ecological Specialists, Inc.<br>114 Alganna Court<br>St. Peters, MO 63376 | (314) 447-4101 | Provided information on freshwater mussels. |
| Smith, Katie | Indiana Dept. of Natural Resources<br>204 West Washington St.<br>Indianapolis, IN 46204 | (317) 232-4080 | Permitting for collection of study animals for hibernating bat sound study. |
| Spurgeon, Tim | ABC Laboratories, Inc.<br>7200 E. ABC Lane<br>Columbia, MO 65202 | (314) 474-8579 | Conducted analytical work on ecotoxicology samples from Fort McClellan. |
| Sternburg, Janet | Missouri Dept. of Conservation<br>Natural History Division<br>2901 West Truman Blvd.<br>Jefferson City, MO 65109 | (314) 751-4115 | Reviewed study plan to assess effects of environmental contaminants on birds, reptiles and amphibians. |
| Steward, Elsa | Missouri Dept. of Natural Resources<br>Jefferson City, MO 65102 | (314) 751-1387 | Agency Coordination |
| Studier, Dr. Eugene | Univ. of Michigan, Flint<br>Biology Dept.<br>303 East Kearsley<br>Flint, MI 48502-2186 | (810) 762-3360 | Provided information on lung surface area of bats for ecotoxicology analyses. |
| Theiling, Charles | Ecological Specialists, Inc.<br>114 Alganna Court<br>St. Peters, MO 63376 | (314) 447-4101 | Provided information concerning benthic macroinvertebrates. |
| Thomas, Dr. Don | Dept. de Biologie<br>Universite de Sherbrooke<br>Sherbrooke, Quebec<br>Canada, J1K 2R1 | (819) 821-7063 | Provided information on lung size of bats for ecotoxicology analyses. |
| Tortorici, Kathy | U.S. Environmental Protection Agency<br>Region VII<br>727 Minnesota Avenue<br>Kansas City, Kansas 66101 | (913) 551-7435 | Agency Coordination concerning the development and formulation of the Alternatives Analysis |
| Turner, Spence | Missouri Dept. of Conservation<br>1110 South College Avenue<br>Columbia, MO 65201 | (573) 882-9880 | Provided input concerning the fishery on the Gasconade River. |
| Turner, Herb | Waynesville Middle School<br>Waynesville, MO | (573) 774-6198 | Provide data related to water quality and benthic macroinvertebrates. |
| Vandyke, James | Missouri Geological Survey<br>Division of Geology/Land Survey<br>611 Fairgrounds Road<br>Rolla, MO 65401 | (573) 368-2100 | Provided information on groundwater. |

| Name | Address | Telephone No. | Reason Contacted |
|---|---|---|---|
| Van Patten, Mark | Conservation Federation of Missouri<br>728 West Main<br>Jefferson City, MO 65101 | (314) 634-2322<br>(800) 575-2322 | Provided information on local conservation organizations and Stream Teams. |
| Wethington, Tracy | Kentucky Dept. of Fish & Wildlife Resources<br>No. 1 Game Farm Road<br>Frankfort, KY 40601 | (505) 564-4406 | Provided weight data on Indiana bats and gray bats for ecotoxicology analyses. |
| Whitaker, Dr. John | Indiana State University<br>Department of Life Sciences<br>6th. and Chestnut<br>Terre Haute, IN 47809 | (812) 237-2400 | Provided information on effects to endangered bats and provided weight data on Indiana bats and gray bats for ecotoxicology analyses. |
| Wilson, Jim | Missouri Dept. of Conservation<br>2901 West Truman Blvd.<br>Jefferson City, MO 65109 | (314) 751-5115 | Provided data on Missouri bald eagle populations. |
| Wong, Dr. Donald | Indiana University, Medical School<br>635 Barnhill Drive<br>Room 205<br>Indianapolis, IN 46202 | (317) 274-2788 | Contributed in analyses of impacts of sound to hibernating and non-hibernating bat auditory systems. |

# LIST OF ACRONYMS AND ABBREVIATIONS

# List of Acronyms and Abbreviations

## LIST OF ACRONYMS AND ABBREVIATIONS

### A

| | |
|---|---|
| ADD | University of Missouri, Columbia's American Archaeology Division, Museum of Anthropology |
| AA | Army Airfield |
| AAFES | Army Air Force Exchange Service |
| AAQS | ambient air quality standard |
| ACAMS | Automatic Continuous Monitoring System |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| ACM | asbestos containing materials |
| ACTS | Army Criteria Tracking System |
| ADEM | Alabama Department of Environmental Management |
| ADI | acceptable daily intake |
| ADT | average daily traffic |
| AIF | applied instruction facility |
| AIT | advanced individual training |
| AL | Alabama |
| ANCOC | Advanced Non-Commissioned Officers Course |
| AOC | area(s) of concern |
| APZ I | Accident Potential Zone I |
| APZ II | Accident Potential Zone II |
| AQCR | Air Quality Control Region(s) |
| AQRV | Air Quality Related Values |
| AR | Army Regulation |
| ARPA | Archaeological Resources Protection Act |
| ASIP | Army Stationing and Installation Plan |
| ASV | armored security vehicle |

### B

| | |
|---|---|
| BA | Biological Assessment |
| BACT | best available control technology |
| BASOPS | base operations support |
| BDO | battle dress overgarment |
| BG | *Bacillus subtillus* var. Niger |
| BIDS | Biological Integrated Detection System |
| BMPs | Best Management Practices |
| BNCOC | Basic Non-Commissioned Officers Course |
| BO | Biological Opinion |
| BRAC | Base Realignment and Closure |
| BRAC 90 | Defense Closure and Realignment Act of 1990 |
| BRAC 95 | Base Realignment and Closure action of 1995 |
| BT | basic training |
| BTU | British thermal unit |

### C

| | |
|---|---|
| CAA | Clean Air Act |
| CAAA | Clean Air Act Amendments |
| CADS | Chemical Agent Disclosure Solution |
| CDTF | Chemical Defense Training Facility |
| CEQ | President's Council on Environmental Quality |
| CEV | combat engineer vehicle |
| CFC | chlorofluorocarbon |
| CFR | Code of Federal Regulations |
| cfs | cubic feet per second |
| CFU | colony forming units |
| CH | Combined Headquarters |
| CH&I | Combined Headquarters and Instruction |
| cm | centimeter |
| CNS | central nervous system |
| CO | carbon monoxide |
| COE | U.S. Army Corps of Engineers |
| CPI | Consumer Price Index |
| CSR | Code of State Regulations |
| CWA | Clean Water Act |

### D

| | |
|---|---|
| DA | Department of the Army |
| DARA | DA Radioactive Material Authorization |
| DATF | Decontamination Apparatus Training Facility |
| dBA | decibels, A-weighted scale |
| dBP | sound pressure level |
| DC | direct current |
| DD | Department of Defense |
| DDESB | Department of Defense Explosive Safety Board |

| | |
|---|---|
| DEH | Directorate of Engineering and Housing (now DPW) |
| DEIS | Draft Environmental Impact Statement |
| DEM | diethyl malonate |
| DF | methylphosphonic diflouride |
| DFAS | Defense Financial Accounting System |
| DNL | day-night sound level |
| DOD | Department of Defense |
| DOL | Directorate of Logistics |
| DOT | U.S. Department of Transportation |
| DPTM | Directorate of Plans, Training and Mobilization |
| DPW | Directorate of Public Works (previously DEH) |
| DRM | Directorate of Resource Management |
| DRMO | Defense Reutilization and Marketing Office |
| DS2 | decontaminating solution |

**E**

| | |
|---|---|
| EA | Environmental Assessment |
| ECAS | Environmental Compliance Assessment System |
| EIFS | Economic Impact Forecasting System |
| EIQ | Emission Inventory Questionnaire |
| EIS | Environmental Impact Statement |
| ENR | Engineering News Record |
| EOD | Explosive Ordnance Detachment or Explosive Ordnance Disposal |
| EPCRA | Emergency Planning and Community Right-to-Know Act |
| EP | effective population |
| EPT | Ephemeroptern, Plecoptera, Trichoptera/Chironomid ratio |
| EPTM | Environmentally Preferred Training Method |
| EPW | Enemy Prisoner of War |
| ERA | Ecological Risk Assessment |
| ES | Executive Summary |
| ESA | Endangered Species Act, 1977 |
| ESMP | Endangered Species Management Plan |

**F**

| | |
|---|---|
| FAA | Federal Aviation Administration |
| FATS | Fire Arms Training Simulator |
| FBI | Family Biotic Index |
| FBO | fixed based operator |
| FEIS | Final Environmental Impact Statement |
| FEMA | Federal Emergency Management Agency |
| FFE | flame field expedient |
| FIA | Federal Impact Aid |
| FLW | Fort Leonard Wood or U.S. Army Engineer Center and Fort Leonard Wood |
| FMC | Fort McClellan or U.S. Chemical and Military Police Center and Fort McClellan |
| FNSI | Finding of No Significant Impact |
| FORSCOM | U.S. Army Forces Command |
| FOTW | Federally Owned Treatment Works |
| FP | facilities plan |
| FWPCA | Federal Water Pollution Control Act |
| FY | fiscal year |

**G**

| | |
|---|---|
| GC | Gas Chromatograph |
| GD | Soman |
| GI | gastrointestinal |
| GIF | general instruction facility |
| GLWACH | General Leonard Wood Army Community Hospital |
| GMT | general military training |
| GOQ | General Officers Quarters |
| GOV | government-owned vehicle |
| gpcd | gallons per capita per day |
| gpm | gallons per minute |
| GPS | global positioning system |

**H**

| | |
|---|---|
| HAP | hazardous air pollutant(s) |
| HAZMIN | Hazardous Waste Minimization |
| HC | hexachlorethane |
| HEPA | high efficiency particulate air filter |
| HL | Mustard-Lewisite |
| HMMWV | high mobility multipurpose wheeled vehicle |
| HPP | Historic Preservation Plan |
| HSC | Health Services Command |
| HVAC | heating, ventilation and air conditioning |

**I**

| | |
|---|---|
| I&M | Inspection and Maintenance Program |
| IAP | Installation Action Plan |
| IBS | Installation Building Survey |
| ICUZ | Installation Compatible Use Zone |
| IDG | Installation Design Guide |
| IDHS | immediate dangerment of health and safety |
| IDLH | immediate dangerment to life and health |
| IET | Initial Entry Training |
| IFWG | Interagency Federal Working Group |
| INRMP | Integrated Natural Resource Management Plan |
| ITRO | Interservice Training Resources Organization |
| ISCP | Installation Spill Contingency Plan |
| ITAM | Integrated Training Area Management Program |

**J**

| | |
|---|---|
| JLUS | Joint Land Use Study |

**K**

| | |
|---|---|
| KCD | Kansas City District, U.S. Army Corps of Engineers |
| KD | kaolin dust |
| kg | kilogram |
| KGAL | thousand gallons |
| km | kilometer |
| KV | kilovolt |
| KVA | kilovolt-amperes |
| KW | kilowatt |

L

| | |
|---|---|
| LCTA | Land Condition Trend Analysis |
| LCLo | lower control limit (oral) |
| LDLo | lowest dose lethal (oral) |
| LEC | Law Enforcement Command |
| LOA | letter of agreement |
| LOAEL | lowest observed adverse effect level |
| LOS | level of service |
| LPG | liquified petroleum gas (propane) |
| LRAM | Land Rehabilitation and Management |
| LR-BSDS | Long Range Biological Standoff Detection System |
| LRMP | Legacy Resource Management Program (Plan) |
| LU & FP | land use and facility plan |
| LDGV | light duty gasoline powered vehicle |
| LVOSS | Light Vehicle Obscuration Smoke System |

M

| | |
|---|---|
| M93 | Nuclear, Biological and Chemical Reconnaissance System (FOX Vehicle System) |
| MACC | Missouri Air Conservation Commission |
| MANSCEN | U.S. Army Maneuver Support Center |
| MARS | Military Affiliate Radio System |
| MAPS | Monitoring Avian Productivity and Survival |
| MBF | million board feet |
| MBTU | million British thermal units |
| MCL | maximum contamination level |
| MDC | Missouri Department of Conservation |
| MDNR | Missouri Department of Natural Resources |
| MEDDAC | U.S. Army Medical Detachment |
| MES | methyl salicylate |
| mg | milligram |
| mg/l | milligrams per liter |
| MG | million gallons |
| MGD | million gallons per day |
| MHTD | Missouri Highway and Transportation Department |
| MINICAMS | Miniature Continuous Agent Monitors |
| ml | milliliters |
| MM | million |
| MO | Missouri |
| MOA | memorandum of agreement |
| MOS | Military Occupational Skill |
| MoDOT | Missouri Department of Transportation |
| MOU | memorandum of understanding |
| MOUT | Military Operations in an Urbanized Terrain |
| MPH | miles-per-hour |
| MSDS | Material Safety Data Sheet |
| MSL | mean sea level |
| MS2 | Male Specific |
| MTMCTEA | Military Traffic Management Command, Transportation Engineering Agency |
| MTO | modified training option |
| MVA | million volt amperes |

N

| | |
|---|---|
| n/a | not applicable |
| NA | No Action (Alternative) |
| NAAQS | National Ambient Air Quality Standards |
| NAF | non-appropriated fund |
| NAGPRA | Native American Grave Protection and Repatriation Act of 1990 |
| NBC | Nuclear, Biological and Chemical |
| NCI | National Cancer Institute |
| NCO | noncommissioned officer(s) |
| NCOA | Noncommissioned Officers Academy |
| NEPA | National Environmental Policy Act |
| NESHAP | national emission standards for hazardous air pollutants |
| NHPA | National Historic Preservation Act |
| NIOSH | National Institute for Occupational Safety and Health |
| NOA | Notice of Availability |
| NOAA | National Oceanic and Atmospheric Administration (including the National Weather Service) |
| NOAEL | no observable adverse effect level |
| NOEL | no observable effect level |
| NOI | Notice of Intent |
| NOX | nitrogen oxide |
| NPDES | National Pollution Discharge Elimination System |
| NRC | Nuclear Regulatory Commission |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NSPS | New Source Performance Standards |
| NTM | neotropical migrants |
| NWI | National Wetland Inventory |
| NWP | Nationwide permit |

O

| | |
|---|---|
| O | officer(s) |
| OB/OD | open burn/open detonation |
| OEA | Office of Economic Adjustment |
| OPS | other protected species |
| OPTM | Optimum Training Method |
| OSHA | Occupational Safety and Health Administration |
| OSUT | one station unit training |

P

| | |
|---|---|
| PAHs | polynuclear aromatic hydrocarbons |
| PAM | pamphlet |
| PAS | Preliminary Assessment Screening |
| PC | personal computer |
| pCi | picocurie |
| PCAS | persistent chemical agent simulant |
| PCBs | polychlorinated biphenyls |
| PEG-200 | polyethylene glycol 200 |
| PEL | permissible exposure limit |
| PL | Public Law |
| PM | particulate matter |
| PM-10 | particulate matter 10 microns or less |
| PN | person, project number, or personnel |
| POI | program of instruction |
| POL | petroleum, oil and lubricants |
| POV | privately-owned vehicle |
| PPI | Producer Price Index |
| ppm | parts per million |

| | |
|---|---|
| PRE | preliminary risk evaluation |
| psi | pounds per square inch |
| PSD | prevention of significant deterioration or proportional stock density |
| PTE | potential to emit |

**Q**

| | |
|---|---|
| QAPP | Quality Assurance Project Plan |
| QL | ethyl (2-diisopropylaminoethyl) methylphosphonite |

**R**

| | |
|---|---|
| RADLAB | radiation laboratory |
| RAM | random access memory |
| RCP | Relocate Current Practice |
| RCRA | Resource Conservation and Recovery Act |
| REC | Record of Environmental Consideration |
| REL | recommended exposure limit |
| RFA | RCRA Facility Assessment |
| RITC | Rehabilitation Instructor Training Course |
| ROD | Record of Decision |
| ROI | region of socioeconomic influence |
| RPO | Radiation Protection Officer |
| RTD | reutilization, transfer, donation |
| RTV | rational threshold value |

**S**

| | |
|---|---|
| SAAM | Small Area Assessment Model |
| SDWA | Safe Drinking Water Act |
| SEL | single exposure level |
| SF | square foot/feet |
| SH | Separate Headquarters |
| SHPO | State Historic Preservation Officer |
| SIC | Standard Identification Code |
| SOP | standard operation procedure(s) |
| SOX | sulphur oxide |
| SPRP | Spill Prevention and Response Plan |
| SRT | Special Reaction Team |
| STB | super tropical bleach |
| STEL | short term exposure limit |
| STRAPs | System Training Plans |
| SVSP | Soil and Vegetation Sampling Plan |
| SWMP | Solid Waste Management Plan |
| SWMU | solid waste management unit(s) |

**T**

| | |
|---|---|
| T&E | Threatened and Endangered Species |
| TA | training area or terephthalic acid |
| TAG | training activity group |
| TBD | to be determined |
| TCA | toxic chemical agents |
| TCLo | total concentration lethal (oral) |
| TDLo | total dose lethal (oral) |
| TDY | temporary duty |
| TES | Traffic Engineering Study |
| TG | training goal |
| TLV | threshold limit value |
| TM | technical manual |
| TPA | terephthalic acid |
| TPH | total petroleum hydrocarbon |
| TPY | tons per year |
| TRADOC | U.S. Army Training and Doctrine Command |
| TRI | Toxic Release Inventory |
| TSD | treatment, storage, or disposal |
| TTU | thermal treatment unit |
| TV | television |
| TWA | time weighted average |

**U**

| | |
|---|---|
| UEPH | Unaccompanied Enlisted Personnel Housing |
| UOPH | Unaccompanied Officer Personnel Housing |
| UPH | Unaccompanied Personnel Housing |
| US | United States |
| USAEC | U.S. Army Engineer Center |
| USAEC&FLW | U.S. Army Engineer Center and Fort Leonard Wood |
| USACERL | U.S. Army Construction Engineering Research Laboratory |
| USAEHA | U.S. Army Environmental Hygiene Agency |
| USC | United States Code |
| USEPA | U.S. Environmental Protection Agency |
| USFS | U.S. Department of Agriculture, Forest Service |
| USFWS | U.S. Department of the Interior, Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| UST | underground storage tank |

**V**

| | |
|---|---|
| VOC | volatile organic compound |

**W**

| | |
|---|---|
| w/ | with |
| w/o | without |
| WW II | World War II |

**X, Y, Z**