Final Supplemental

ENVIRONMENTAL IMPACT STATEMENT

FOR F-35 BEDDOWN AT EGLIN AIR FORCE BASE, FLORIDA

JANUARY 2014

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
26 JUN 2014	**Supplemental Environmental Impact Statement**	**00-00-2011 to 00-00-2014**

4. TITLE AND SUBTITLE **Final Supplemental Environmental Impact Statement for F-35 Beddown at Eglin Air Force Base, Florida**	5a. CONTRACT NUMBER 5b. GRANT NUMBER 5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER 5e. TASK NUMBER 5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **United States Air Force,Eglin Air Force Base,Okaloosa,FL,32542**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S) 11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
Final Supplemental Environmental Impact Statement for F-35 Beddown at Eglin Air Force Base, Florida

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**593**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

Record of Decision
Final Supplemental Environmental Impact Statement
F-35 Beddown at Eglin Air Force Base, Florida

INTRODUCTION

This Record of Decision (ROD) documents the Air Force's decision regarding the implementation of the Joint Strike Fighter (JSF or F-35) beddown portion of the Base Realignment and Closure (BRAC) decisions and related actions at Eglin Air Force Base (AFB), Florida. In making this decision, the information, analysis, and public comments contained in the *Final Supplemental Environmental Impact Statement (SEIS) for F-35 Beddown at Eglin AFB, Florida*, January 2014 (*Federal Register*, Vol. 79, No. 40, EIS No. 20140047, pg. 11428), were considered, among other relevant factors and supporting materials.

This ROD is prepared in accordance with the regulations implementing the National Environmental Policy Act (NEPA), Title 42 U.S.C. §4321-4347; the President's Council on Environmental Quality (CEQ) NEPA regulations at 40 CFR, §1505.2, *Record of decision in cases requiring environmental impact statements*; and 32 CFR §989.21, implementing the Air Force Environmental Impact Analysis Process (EIAP). Specifically, this ROD:

- States the Air Force's decision;
- Identifies all alternatives considered by the Air Force in reaching the Initial Joint Training Site (IJTS) decision and specifies the alternative considered environmentally preferable;
- Identifies and discusses relevant factors balanced by the Air Force in making the IJTS decision, including economic and technical considerations, the Air Force's missions, and essential national policy considerations, and states how those considerations entered into the decision;
- States whether all practicable means to avoid or minimize environmental harm resulting from the selected alternative have been adopted, and if not, why they were not; and
- Carries forward and continues the existing mitigation, monitoring, and enforcement program based on the February 2009 ROD and directs its revision to reflect the analyses in the SEIS and this ROD.

DECISION SYNOPSIS

The Air Force will implement the No Action Alternative. The No Action Alternative reflects the Air Force's "Record of Decision, Implementation of Base Realignment and Closure (BRAC) 2005 Decisions for the Joint Strike Fighter (JSF) Initial Joint Training Site (IJTS), Eglin AFB, Florida," dated February 5, 2009 (*Federal Register*, Volume 74, page 34, February 23, 2009) as combined with, and updated by, the information, analysis, and public comments contained in the SEIS (Pgs. 2-2 to 2-4, §2.1). The No Action Alternative in the SEIS allows for the limited operations of 59 F-35 aircraft as established by the February 2009 ROD. The mitigation and monitoring plan (MMP) based on the February 2009 ROD, entitled *BRAC 2005 Decisions and Related Actions Final Mitigation and Monitoring Plan for JSF at Eglin AFB* (May 2009) (hereafter 2009 MMP for JSF at Eglin AFB (EAFB)) and the provisions applicable to F-35 operations and procedures in *Eglin Air Force Base Instruction, 11-201, Flying Operations, Air Operations* (1 May 2013) (hereafter *EAFBI 11-201*) will be updated to include the mitigations built into the No Action Alternative and operational monitoring required by this ROD.

The Air Force will also implement related actions, such as the recommendations from the Gulf Regional Airspace Strategic Initiative (GRASI).

BACKGROUND

The Air Force issued a ROD in February 2009 which addressed the F-35 IJTS and resulted in a decision to implement a portion of the F-35 IJTS Alternative 1 presented in the October 2008 Final Environmental Impact Statement (FEIS). That decision included the delivery of 59 Primary Aerospace Vehicle Authorized (PAA) F-35 aircraft, associated cantonment construction, and limited certain F-35 flight training operations at Eglin Main Base.

The primary purpose of the SEIS was to analyze the beddown, location, operational alternatives and possible mitigations for the 59 PAA F-35s authorized for delivery by the February 2009 ROD (Air Force (Twenty-four (24) PAA F-35A aircraft), Navy (Fifteen (15) PAA F-35C aircraft), and Marine Corps (Twenty (20) PAA F-35B aircraft)) including the use of the Duke Field airfield and construction of a new runway at Eglin Main Base. The SEIS analyzed additional alternatives regarding the proposed distribution of F-35 flight operations, on and off the Eglin Main Base, to allow efficient pilot training, deconflict flying operations with other military and civilian operations, and reduce or avoid noise impacts on sensitive receptors.

The SEIS evaluated beddown locations on the Eglin Reservation, operational parameters, and the degree to which other mitigation measures are possible. The SEIS contains analyses of operational alternatives and presents potential mitigations for the 59 aircraft authorized to be delivered to Eglin AFB under the February 2009 ROD. Due to the potential noise impacts both on and off Eglin AFB the Air Force imposed, via the February 2009 ROD, temporary operational limitations on F-35 flight training activities to avoid and minimize noise impacts. These limitations were to remain in place until the SEIS was completed and the Air Force decided how best to proceed, recognizing that these limitations might not be practical for use on a long-term basis. The reduced flight operations were distributed among all three airfields (Eglin Main Base, Duke Field, and Choctaw OLF).

To reduce noise impacts over the City of Valparaiso, runway (RW) 12/30 was identified as the primary runway for F-35 operations at Eglin Main Base. Limited F-35 operations were allowed from RW 19, which, other than takeoffs, included only those flight operations necessary for emergencies, unplanned contingencies and weather affecting aircraft performance limitations and requirements. Limited F-35 operations were allowed from RW 01, which, other than approaches and landings, includes only those flight operations necessary for emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements.

The F-35 Joint Program Office (JPO) released updated noise profiles for all three F-35 variants after the Draft SEIS was published in September 2010; consequently, the Air Force delayed the release of the Final SEIS. During the delay, HQ AETC revised the F-35 operational plans, and the GRASI was completed. As more fully discussed in the SEIS (§1.2.6, pages 1-6 thru 1-11), the Air Force then provided updated analyses to address several changes regarding updated noise profiles, revised F-35 operational plans (program requirements, utilization rates, night operations, student production, and operational tables that support the roll-up in Appendix E, Table E-16) and GRASI airspace recommendations (SEIS, Table 1-2).

The Air Force summarized the substantive comments received on the 2010 Draft SEIS and provided Air Force responses in §1.4.4 of the Final SEIS. The Final SEIS's Appendix A, Volume II provides copies of government agency comments on the 2010 Draft SEIS. Copies of agency and public comments received on the 2013 Revised Draft SEIS and the Air Force's responses to those substantive comments are presented in the SEIS at Appendix A, Volume III.

ALTERNATIVES CONSIDERED

As more fully discussed in the SEIS (Pg. 2-8, Chap. 2), the Air Force alternatives on the Eglin Reservation require a primary operating base, or Main Operating Base (MOB). The MOB will provide aircraft maintenance, logistical support, a ramp for nighttime beddown, and functions as the location from which aircraft would be launched and recovered.

The alternatives in the 2008 FEIS looked exclusively at existing facilities and located the training and maintenance facilities, hangars and dorms near the main airfield to meet the BRAC goals and objectives of using existing capacity, reducing costs, and capturing efficiencies.

The SEIS was not limited by BRAC's goals and objectives. In the SEIS, the Air Force considered (1) siting the MOB at locations other than Eglin Main Base, (2) adding an additional runway at each of the existing auxiliary fields and (3) changing the configuration of the Eglin Main Base runway to avoid noise impacts to local areas, such as the City of Valparaiso.

To identify reasonable alternatives, the Air Force developed a three-phase screening process (SEIS, Pgs. 2-8 to 2-20, §2.3). Phase 1 developed and applied initial screening criteria for the Main Operating Base and auxiliary fields. Phase 2 involved presenting the results of the initial screening process at public scoping meetings and considering public input. Phase 3 incorporated additional public and local military user input received after the scoping meetings to develop the alternatives carried forward for detailed analysis.

The three-phase alternative screening process revealed that two primary, or "anchor" locations, could support the Main Operating Base airfield requirements; Eglin Main Base and Duke Field. Using these anchor alternatives, a 50-NM radius was mapped and each field within that radius was evaluated under established screening criteria for auxiliary fields.

Choctaw Field, Duke Field, and Eglin Main RW 12 met all the screening criteria for auxiliary fields. These auxiliary fields would receive the majority of F-35 operational flight training. Tyndall AFB and Naval Air Station (NAS) Pensacola would be used as Practice Instrument Approach Fields (PIAFs) (PIAFs are not considered auxiliary fields; NAS Pensacola and Tyndall AFB are the only airfields to be used as PIAFs). Other F-35-compatible airfields within the surrounding area may be used on an infrequent basis. Alternatives that were carried forward for analysis in the SEIS were:

- No Action - The decision made in the February 2009 ROD allowing delivery of 59 F-35 aircraft, construction, and limited flight training operations at Eglin Main Base as analyzed, described, and documented in the SEIS.
- 1A - No Runway Limitations at Eglin Plus Use of Duke Field and Choctaw Field.
- 1I - One New Runway at Eglin Plus Use of Duke Field and Choctaw Field.
- 2A - Duke Field Parallel Runways and Landing Helicopter Amphibious (LHA) area Plus Choctaw Field.

- 2B - Duke Field Parallel Runways and LHA Plus Eglin RW 12.
- 2C - Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field.
- 2D - Duke Field Single Runway and LHA Plus Eglin RW 12 and Choctaw Field.
- 2E - Duke Field Single Runway and LHA Plus Choctaw Field.

Alternatives 1B, 1C, 1D, 1E, 1F, 1G, and 1H were presented at the public scoping meetings, but were eliminated as alternatives carried forward for detailed analysis (SEIS, Pg. 2-21, §2.3.2).

No Action Alternative: The No Action Alternative for the SEIS includes the 59 PAA F-35 aircraft, the associated cantonment construction, and continued limited flight training operations at Eglin Main Base as directed in the February 2009 ROD. The No Action Alternative analyzes the beddown of the three squadrons allowed by the February 2009 ROD; an Air Force squadron with 24 PAA F-35As, a Marine Corps Fleet Replacement Squadron with 20 PAA F-35Bs, and a Navy Fleet Replacement squadron with 15 PAA F-35Cs. Delivery of these ROD-approved F-35s at Eglin AFB began in July 2011. It should be noted that several years have elapsed since the February 2009 ROD; consequently the Air Force also updated the baseline data in the SEIS's No Action Alternative to reflect the most current information. For the SEIS (Pg. 2-2, §2.1), the existing conditions effectively are the consequences associated with the No Action Alternative; thus, those consequences were generally presented as the existing conditions (Chapter 3) for each affected resource.

Alternative 1A – No Runway Limitations at Eglin, Plus Use of Duke Field and Choctaw Field: Alternative 1A would eliminate RW 01/19 flight limitations identified in the February 2009 ROD, and enable approximately 30 average annual operations per day for F-35 training. Duke Field and Choctaw Field would be used as auxiliary fields to support flight training activities. The Air Force identified Alternative 1A as the Preferred Alternative for the SEIS.

Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field: Under Alternative 1I, one new runway with a minimum length and width of 8,000 by 150 feet would be constructed to the northwest of RW 12/30 on Eglin Main Base (SEIS Pgs. 2-41 to 2-42, Figures 2-15 and 2-16). The total acreage to be cleared for construction would be 2,127 acres. This alternative would include a taxiway across Highway (Hwy) 85 to Eglin Main Base. Live munitions would need to be transported by wheeled vehicles to a new live ordnance loading area(s) located near the new runway area. A new precision instrument approach would be installed on the new runway. Choctaw Field and Duke Field would supplement activities on these new runways and be used as auxiliary fields.

Common Elements Among No Action Alternative and Alternatives 1A and 1I: There are certain common elements (SEIS, Pg. 2-38, §2.3.4) among the No Action Alternative and all the Alternative 1 scenarios. The MOB would be Eglin Main Base, while any combination of Duke Field and Choctaw Field could be used for auxiliary fields. Environmental effects of operations associated with the 59 F-35 aircraft at each airfield were analyzed for each of these alternatives.

All facilities evaluated in the SEIS (with the exception of the new runways being proposed under Alternatives 1I, 2A, 2 B, and 2C) were previously analyzed in the 2008 FEIS. F-35 aircraft would utilize the runways at NAS Pensacola and Tyndall AFB for practice approaches under all of the action alternatives, including the No Action Alternative (SEIS, §2.3.4, §2.3.1.2, et al).

The 2014 Final SEIS includes 1,947 operations at NAS Pensacola and 6,862 operations at Tyndall AFB.

All alternatives were designed to minimize or avoid the routine use of RW 01/19 to avoid or reduce noise impacts to the maximum extent practical. Appendix E, Pg. E-85, Table E-16 provides the number and types of flights that would occur on RW 01/19 for each alternative, including the No Action Alternative.

Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field: Under this alternative, parallel runways would be created by the construction of one new runway to the east of Duke Field's current area of operations (SEIS Pg. 2-44, Fig. 2-17). The new runway would have a minimum length and width of 8,000 by 150 feet. In addition to the new runway construction, an LHA strip and separate vertical landing pads would be constructed. The total acreage to be cleared for the construction would be 3,078 acres.

Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12: This alternative is generally the same as Alternative 2A; however, flight operations would be supplemented by the use of Eglin Main RW 12.

Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field: Under this alternative, the notional location and construction activities would be the same as Alternative 2A, however, flight operations would be supplemented by the use of Eglin Main RW 12 and Choctaw Field.

Alternative 2D – Duke Field Single Runway and LHA Plus Eglin RW 12 and Choctaw Field: Under this alternative, the current runway would be utilized. Precision instrument approach training would occur at Duke RW 18 using the existing Instrument Landing System (ILS), while Choctaw Field and Eglin Main RW 12 would supplement flight operations.

Alternative 2E – Duke Field Single Runway and LHA Plus Choctaw Field: Under this alternative, the current runway would be utilized. Precision instrument approach training would occur on Duke RW 18 using the exiting ILS, while Choctaw Field would supplement flight operations. However, various fields in the surrounding area may be used as PIAFs or to relieve potential congestion. Those operational activities will be at transient levels.

Common Elements Among Alternatives 2A, 2B, 2C, 2D, and 2E: The Main Operating Base for Alternatives 2A, 2B, 2C, 2D, and 2E would be Duke Field using various combinations of Eglin Main RW 12 and Choctaw Field as auxiliary fields. All alternatives were designed to minimize or avoid the routine use of RW 01/19 to avoid or reduce noise impacts to the maximum extent practical. Appendix E, Pg. E-85, Table E-16, provides the number and types of flights that would occur on RW 01/19 for each alternative, including the No Action Alternative.

Environmental effects of 59 F-35 aircraft operations at each airfield were analyzed for all alternatives. The 2014 Final SEIS includes 1,947 operations at NAS Pensacola and 6,862 operations at Tyndall AFB.

A fuel line from Eglin Main Base would be constructed to provide the appropriate volume of JP-8 (jet fuel) to support training activities and would be built within current utility easements or rights-of-way and would Parallel Hwy 85 and Hwy 123. New facilities proposed for construction are similar, except for the new parallel runways and related facilities under Alternatives 2A, 2B, and 2C.

All support facilities for the IJTS such as dormitories, academic training, and flight simulators as outlined in the FEIS were located at Eglin Main Base as previously approved in the February 2009 ROD and were not subject to analysis in the SEIS. Those facilities would continue to be used as planned and not constructed at Duke Field (SEIS, pg. 2-43, §2.3.5.)

Environmentally Preferred Alternative

Of the alternatives considered in the SEIS and carried forward in this ROD, the environmentally preferred alternative is the No Action Alternative. This alternative resulted from the 2009 BRAC ROD authorization of delivery of 59 PAA F-35 aircraft, associated cantonment construction and limited flight training operations on RW 01/19 that, other than approaches and landings to RW 01 and departures on RW 19, only include emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements. Under the No Action Alternative, the average F-35 operations per day off RW 01/19 would be 0.77 (SEIS, Appendix E, Table E-16). Noise impacts under this alternative were compared to the 2006 Eglin AFB Air Installation Compatible Use Zone (AICUZ) Study, which was used for the Eglin Main Base noise impacts baseline in the October 2008 FEIS. The No Action Alternative resulted in 607 fewer individuals impacted by 65 dB DNL than in 2006.

RWs 19 and 30 are the only runways on Eglin Main Base equipped with an ILS. The No Action Alternative would continue training inefficiencies resulting from the flight restrictions on RW 01/19. This alternative would also increase training costs associated with placing additional instrument flight rules (IFR) operations at other airfields within the region. These flight restrictions degrade operational capability and significantly limit the Air Force's decision space when planning for known contingencies such as temporary runway closures for construction and/or repair.

SEIS PUBLIC INVOLVEMENT

- Draft SEIS Notice of Availability (NOA) - Federal Register, Vol. 75, No. 185, September 24, 2010 with associated public media announcements.
- Public hearings in the following Florida communities: Valparaiso (October 12, 2010), Niceville (October 13, 2010), and Crestview (October 14, 2010).
- Revised Draft SEIS NOA - Federal Register, Vol. 78, No. 115, June 14, 2013 with associated public media announcements to address updated F-35 operational plans and updated noise/flight profiles, as well as results from a regional airspace study (e.g., GRASI) that was completed after the 2010 Draft SEIS was published. During the public review process for the Revised Draft SEIS, a public hearing was held in Valparaiso, Florida, on July 9, 2013.

MITIGATIONS

Noise

All of the action alternatives, including the no action alternative, involved relocating some percentage of the F-35A/B/C aircraft operations from the existing runways at Eglin Main Base to runways that are surrounded by fewer noise-sensitive land uses. Mitigations that were incorporated into all of the alternatives to reduce and/or avoid impacts are:

- Substantial reduction in the number of total operations from the number analyzed in the BRAC 2005 FEIS and the 2010 Draft SEIS.
- Reduction in the number of flights on RW 01/19 from those analyzed in the BRAC 2005 FEIS and the 2010 Draft SEIS.
- Use of PIAFs to reduce ILS use of RW 19.
- Change in flight profiles for all three F-35 variants.
- Change in flight tracks for all three F-35 variants.
- Adjusted arrival and departure procedures.
- Reduced from the BRAC 2005 FEIS the number of "late night" (between 10:00 PM and 7:00 AM) flying operations.
- Use of flight simulators for some training.

Specific aspects of flying at Eglin AFB that will be regularly reexamined within the context of mitigation, monitoring and management include, but are not limited to:

- Modifying ground tracks used by aircraft to avoid noise-sensitive areas to a greater degree.
- Modifying altitude, engine power setting and airspeed profiles used by the F-35 to reduce impacts to noise sensitive areas.
- Modifying the F-35 training plan, as more experience is gained with training pilots on the F-35, to minimize training event requirements that are not absolutely necessary for pilot combat readiness.

The SEIS presented impacts associated with two types of potential impacts; those associated with the F-35 beddown construction and ground operations (SEIS Pg. 2-50, Table 2-17), and those connected with F-35 flight operations (SEIS Page 2-58, Table 2-18). These tables also reflect the No Action Alternative condition for each resource.

In the February 2009 ROD, mitigations were applied relative to noise. Limitations were imposed on operations to Runway 01/19 for F-35 aircraft pending the outcome of the SEIS and related ROD. In developing the noise impacts discussed in the FEIS, average daily operations by runway were allocated and the distribution of flight tracks and distribution of daily operations were determined.

Under the SEIS, No Action Alternative flight operations of the F-35 aircraft are constrained so as to minimize noise impacts on residential areas. The SEIS summarized the number of residents in the vicinity of Eglin Main Base, Duke Field and Choctaw Field potentially exposed to noise levels greater than 65 dB DNL and the estimated number of populations of concern affected by noise levels greater than 65 dB DNL under the No Action Alternative (SEIS Pg. 3-49, Table 3-13).

Since the over flights are what causes the direct noise impacts over Valparaiso, the Air Force limited F-35 operations over Valparaiso to avoid new noise impacts to the maximum extent possible. Runway 12/30 was identified as the primary runway for F-35 operations at Eglin Main

Base. The local Eglin AFB flying instruction (EAFBI 11-201) was amended to include F-35 operations and includes the following limitations:

- RW 12/30 was identified as the primary runway at Eglin Main Base for F-35 operations.
- RW 19 operations other than takeoffs included only those flight operations necessary for emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements. RW 01 operations other than approaches and landing, included only those flight operations necessary for emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements. These limited RW 01/19 operations are to ensure flight safety and/or protect persons or property from harm.

Due to the changes in noise and operational data noted above, the No Action Alternative is not completely synonymous with the February 2009 ROD, therefore the 2009 MMP for JSF at Eglin AFB (EAFB) and F-35 operations and procedures in *EAFBI 11-201* will be updated to include the mitigations built into the No Action Alternative.

The 33rd Operations Group Commander (33 OG/CC) will be responsible for tracking and enforcing flight limitations on RW 19 (other than takeoffs) and RW 01 (other than approaches and landings) to include only those flight operations necessary for emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements. The 33 OG/CC will be assisted by both the 33rd Fighter Wing (33 FW) and 96th Operations Support Squadron (96 OSS) Tower in tracking and enforcement of these flight limitations.

Air Quality

Air quality mitigations identified in the 2009 MMP for JSF at EAFB will be carried forward and implemented for remaining F-35 related construction.

Airspace

As discussed (SEIS Pg. 3-6, §3.2.6), flight training operations associated with the No Action Alternative would impact air traffic controller workload and would contribute to increased congestion (air and ground delays) for military and civilian aircraft across the region. The following GRASI recommendations relating to the F-35 mission (SEIS Pg. 1-6, §1.2.6 and Pg. 2-38, §2.3.4) will assist the Air Force to minimize congestion and related impacts:

- Utilization of special use airspace (SUA). Additional non-Eglin-controlled airspace was incorporated to expand training opportunities. Additional SUA units evaluated include Camden Ridge/Pine Hill, Carabelle East/West, Compass Lake, Desoto/Restricted Area R-4401, Warning Area W-155, W-470 and Moody 1, 2, and 3 and Military Training Routes IR-17/IR-31, VR-1017/VR-1056 (SEIS Pg. 1-10, Table 1-2).
- Relocation of simulated flameout operations. Some simulated flameout approaches have been shifted from Eglin Main Base and Duke Field to Choctaw Field and Tyndall AFB to improve airspace in the North/South corridor.
- Creation of new Air Traffic Control Assigned Airspace (ATCAA). Four new ATCAAs are currently being established.

- Efficient use of airspace. Use of airspace within R-2915 and R-2914 involves utilizing a new scheduling tool that would track and compare scheduled airspace with airspace actually utilized in order to increase efficiency and allow for more flexibility.

Several other recommendations provided during the GRASI study may help improve overall congestion in the region and aid air traffic controllers in their decision making process. These recommendations may be implemented over time:

- Establishing standard instrument departures (SIDs) and standard terminal arrival routes (STARs) through coordination with other locations and routing entry points for east-west aircraft traffic over shoreline airspace for ascent and descent in order to increase efficiency.
- Operating hours. A study is currently being conducted on the feasibility of expanding operations to six days a week, however a decision has not yet been made.
- Landscape-scale training. Establishing new partnerships for landscape-scale training involves utilizing nonmilitary airspace and compatible private, local, state, and federal lands for nonhazardous missions. A long-term study to identify requirements and opportunities for increased mission capability and flexibility was started in April 2012.
- North Pensacola Military Operating Area (MOA) reorganization. Reorganizing the North Pensacola MOA is currently being evaluated by the Navy for feasibility.

Transportation

The demand on several roadways equates to the need for capacity improvements. Improvements that should be considered, but are outside direct control of the Air Force, include Congestion Management System (CMS) and Transportation System Management (TSM) projects, a corridor management plan that looks at access along the corridor and transit improvements. The Air Force has and will continue to work with the local counties and Florida Department of Transportation (FDOT) to improve the public transportation system throughout the region. The Transportation Mitigation section of the 2009 MMP for JSF at EAFB will be carried forward and updated as needed.

Physical Resources

To minimize the potential for impacts to groundwater, wetlands, floodplains and other surface water resources identified in the February 2009 ROD, the management requirements directed to be employed in the February 2009 ROD and the water quality mitigations and erosion control management actions included in the 2009 MMP for JSF at EAFB are carried forward and will continue to be employed.

Cultural Resources

The Air Force will implement mitigation measures provided through the National Historic Preservation Act (NHPA) §106 project-specific amended programmatic agreement (SEIS, Appendix F, *Cultural Resources*) and as defined in the existing 2009 MMP for JSF at EAFB.

Biological Resources

The management actions, prohibitions and limitations directed in the February 2009 ROD and mitigation measures identified in the 2009 MMP for JSF at EAFB are carried forward and will continue to be employed.

Safety

The management actions and safety measures directed in the February 2009 ROD and identified in the 2009 MMP for JSF at EAFB for day-to-day construction and maintenance activities are carried forward and will continue to be employed.

UNAVOIDABLE IMPACTS

Certain F-35 activities were projected to result in disturbance and/or noise within areas not previously subject to these effects (SEIS, Pg. 2-81, §2.6.3). Some impacts that cannot be mitigated would occur and some of these impacts could be considered adverse or annoying to potentially affected individuals. Potential impacts that could occur and cannot be mitigated are the same as those included in the February 2009 ROD.

FINDINGS ON ACTIONS NOT CONSIDERED REASONABLY FORESEEABLE

As discussed in the SEIS (Pg. 5-6, §5.1.3.1) all basing actions, such as future weapon system changes, unit moves, increases in manpower of 35 or more persons proposed to take place on Air Force real property must be approved via the Air Force Strategic Basing process set out in Air Force Instruction (AFI) 10-503, *Strategic Basing*, dated 27 September 2010.

Until an approved site survey is accomplished and the environmental impact analysis process is completed, no final basing decision can be approved. Until final approval for basing has been granted by the Air Force Strategic Basing Structure, no irretrievable commitment of resources can occur, as equipment and personnel cannot move onto an installation and force structure cannot be altered.

The Air Force is aware of several conceptual actions or proposals that are not ripe for decision-making and were thus not considered to be reasonably foreseeable actions for purposes of the SEIS or this ROD. Such conceptual actions or proposals included, but are not limited to:

- F-35 Mission/Model changes. The primary purpose of the SEIS and this ROD are to analyze the beddown location, the operational alternatives and feasible mitigations for the 59 PAA F-35 (24 Air Force Conventional Takeoff and Landing (CTOL), 20 Marine Corps Short Takeoff and Vertical Landing (STOVL), and 15 Navy Carrier Variant (CV) aircraft controlled by the 33 FW) authorized for delivery by the February 2009 ROD. Any deviation from the planned F-35 mission identified in this ROD would be considered a basing action and would require Air Force approval per guidance above.
- F-35 Foreign Military Sales (FMS). The operations associated with FMS training are analyzed under the operations associated with training of international Partners described in the SEIS. Foreign students will operate within the 59 PAA F-35 framework authorized by the February 2009 ROD and the total numbers of operations reflected in the operational tables and operational plans reflected in §1.2.6 of the SEIS.
- F-35 Test and Evaluation. The extent of any F-35 test and evaluation at Eglin AFB under this SEIS is impliedly limited to the number of F-35s allocated to Eglin, the concept and

scope of operations, their impacts, and feasible mitigations analyzed in the draft and final published versions of this SEIS and approved in the Air Force ROD. Any increase in F-35 test and evaluation aircraft at Eglin above 59 PAA would be considered a basing action.

- Relocation of Air Force Special Operations Air Warfare Center (SOAWC) from Hurlburt Field to Duke Field would be considered a separate basing action.

DECISION

The Air Force will implement the No Action Alternative including the operational limitations imposed to reduce noise over the City of Valparaiso in the February 2009 ROD. This decision adopts the No Action Alternative evaluated in the SEIS in the following particulars:

- RW 12/30 is the primary runway at Eglin Main Base for F-35 operations.
- RW 19 operations: other than takeoffs, includes only those flight operations necessary for emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements.
- RW 01 operations: other than approaches and landing, includes only those flight operations necessary for emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements.

These limited RW 01/19 operations are to ensure flight safety and/or protect persons or property from harm.

In the event that RW 01/19 flight operations occur for an emergency, unplanned contingency, or weather affecting aircraft performance limitations and requirements, the 33 OG/CC will prepare a written explanation, documenting the circumstances, including aircraft call sign, the nature of the planned operation, and the reasons that caused the unplanned takeoff or landing operation on RW 01/19 within five (5) working days. Upon request, the 33 OG/CC will provide this data, along with a written explanation to both the 33 FW/CC and the 96 TW/CC within 5-working days. The 33 OG/CC will be assisted by 96 OSS Tower in tracking and enforcement of the general limitations described above.

This recordkeeping/reporting requirement becomes effective the date this ROD is signed and will continue for at least two years from the date of delivery of the fifty-ninth (59th) PAA F-35 aircraft allowed under this and the February 2009 ROD.

These requirements regarding the written explanations will be reflected in EAFBI 11-201 provisions applicable to F-35 operations and procedures and will be made a part of the revised 2009 MMP for JSF at EAFB within 90 days of the signing of this ROD.

The No Action Alternative for the SEIS includes the 59 F-35 aircraft, the associated cantonment construction, and limited flight training operations that were implemented at Eglin Main Base as described in the February 2009 ROD. The No Action Alternative includes the beddown of three F-35 squadrons, as follows: an Air Force squadron with twenty-four (24) PAA F-35A aircraft, a Marine Corps Fleet Replacement Squadron with twenty (20) PAA F-35B aircraft, and a Navy Fleet Replacement squadron with fifteen (15) PAA F-35C aircraft.

All the operational limitations will be implemented as noted above. Annual Air Traffic Control operations associated with the No Action Alternative for 59 F-35 aircraft were addressed in the SEIS (Table 2-2, et al). Appendix E, Page E-85, Table E-16, provides details on the number of flights that would occur on RW 01/19. Under the No Action Alternative, no F-35 afterburner departures will occur during "late night" (between 10:00 PM and 7:00 AM) on Eglin Main Base (SEIS, Pg. 3-13, Table 3-3; and Appendix E, Table E-16).

The Air Force will also implement recommendations from the GRASI to include utilization of non-Eglin-controlled SUA. This airspace was incorporated into the SEIS to expand training opportunities. SUA units to be used include Camden Ridge/Pine Hill, Carabelle East/West, Compass Lake, Desoto/Restricted Area R-4401, Warning Area W-155, W-470 and Moody 1, 2, & 3 and Military Training Routes IR-17/IR-31, VR-1017/VR-1056 (SEIS Pg. 1-10, Table 1-2 and Pg. 3-6, §3.2.4). The Air Force will continue working with the FAA to establish four Air Traffic Control Assigned Airspaces (ATCAA) under a memorandum of understanding with the FAA, at altitudes greater than 24,000 feet above ground level (SEIS, Pg. 2-38).

Tyndall AFB and NAS Pensacola will be utilized as PIAFs (SEIS Pg. 2-14, §2.3.1.2, et seq). The F-35 flight operations projected at NAS Pensacola (SEIS Pg. 2-38, §2.3.4) are the same as those stated in the 2008 FEIS. These flight operations were compared to those of the current NAS Pensacola AICUZ study and there were no differences in the contours, while operations projected for NAS Pensacola are consistent with levels described in the FEIS. Limitations already established with NAS Pensacola will be identified in the update to the 2009 MMP for JSF at EAFB.

Some simulated flameout approaches will be shifted from Eglin Main Base and Duke Field to Choctaw Field and Tyndall AFB to improve airspace in the North/South corridor (SEIS Pg. 1-9, §1.2.6).

The Air Force will use a new tracking tool to monitor the use of airspace within R-2915 and R-2914 by tracking and comparing scheduled airspace with airspace actually utilized in order to increase efficiency and allow for more flexibility.

The 2009 MMP for JSF at EAFB and the provisions applicable to F-35 operations and procedures in *EAFBI 11-201* will be updated to include the mitigations built into the No Action Alternative and to reflect that the 33 OG/CC is responsible for tracking and enforcing both the identified limitations (e.g. RW 19 operations (other than takeoffs) and RW 01 operations (other than approaches and landings) including only flight operations necessary for emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements) and average annual daily operations generally no later than 90-days from the date of this ROD.

The 33 OG/CC will be assisted by both the 33 FW and 96 OSS Tower in tracking and enforcement of the limited exceptions and general limitations described above. Tracking of the operations will be from the date of this decision until two full years from the date of delivery of the fifty-ninth (59th) PAA F-35, at which point the IJTS will be reevaluated to ensure the operations are meeting the needs of the IJTS.

26 Jun 14

Timothy K. Bridges
Deputy Assistant Secretary of the Air Force
(Installations)

Date

COVER SHEET
F-35 BEDDOWN AT EGLIN AIR FORCE BASE
FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

a. *Responsible Agency*: U.S. Air Force
b. *Cooperating Agencies*: Not Applicable
c. *Proposals and Actions*: This Final Supplemental Environmental Impact Statement (SEIS) describes the potential consequences to the human and natural environment from the implementation of various Alternatives for implementing the Joint Strike Fighter (JSF) beddown portion of the Base Realignment and Closure (BRAC) decisions and related actions at Eglin Air Force Base (AFB), Florida. The locations of the proposed beddown activities are in Okaloosa and Santa Rosa Counties in Florida. Airspace over the following counties may also be affected by JSF training activities: Bay, Calhoun, Franklin, Jackson, Liberty, Gulf, Okaloosa, Santa Rosa, Wakulla, Walton, and Washington Counties in Florida; Coffee, Choctaw, Clarke, Covington, Crenshaw, Dallas, Geneva, Henry, Houston, Marengo, Monroe, Washington, and Wilcox Counties in Alabama; Baker, Calhoun, Clay, Decatur, Early, Miller, Mitchell, Quitman, Randolph, and Seminole Counties in Georgia; and Forest, George, Greene, Perry, and Stone Counties in Mississippi.
d. *Comments and Inquiries*: Questions regarding this document should be directed to Mr. Mike Spaits, Eglin AFB Public Affairs Office, 96 TW/PA, 101 West D Avenue, Room 238, Eglin AFB, FL 32542-5499; telephone: (850) 882-2836; or email: spaitsm@eglin.af.mil.
e. *Designation*: Final Supplemental Environmental Impact Statement
f. *Abstract*: This Final SEIS has been prepared in accordance with the National Environmental Policy Act (NEPA) to analyze the potential environmental consequences of the proposed beddown of the JSF and establishment of an Initial Joint Training Site (IJTS) at Eglin AFB, Florida, and the No Action Alternative. The Air Force's "Record of Decision, Implementation of Base Realignment and Closure (BRAC) 2005 Decisions for the Joint Strike Fighter (JSF) Initial Joint Training Site (IJTS), Eglin AFB, Florida," dated February 5, 2009, (*Federal Register*, Volume 74, page 34, February 23, 2009) addressed the JSF IJTS and resulted in a decision to implement a portion of the JSF IJTS Alternative 1 presented in the *Proposed Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions at Eglin AFB, FL Final Environmental Impact Statement* (FEIS). That decision authorized the delivery of 59 F-35 aircraft (i.e., one squadron each for the Air Force, Navy, and Marine Corps), associated cantonment construction, and limited flight training operations from Eglin Main Base. The Record of Decision (ROD) also determined that preparing an SEIS would further the purposes of NEPA. A Draft SEIS was published in September 2010 that evaluated where to ultimately beddown the 59 F-35 aircraft and also analyzed alternatives for the operations of the 59 F-35 aircraft to be delivered to Eglin AFB under the February 2009 ROD. The No Action Alternative in the SEIS allows for the limited operations of 59 F-35 aircraft as established by the February 2009 ROD. Since September 2010, the Air Force revised the F-35 operational plans and released updated noise/flight profiles for the F-35, and a regional airspace study was completed. The Air Force published a Revised Draft SEIS in June 2013 to update the analyses to address those changes. This SEIS analyzes potential impacts associated with airspace, noise, land use, socioeconomics and environmental justice, transportation, utilities, air quality, safety, solid waste, hazardous materials and hazardous waste, physical resources, biological resources, and cultural resources. This SEIS also identifies mitigations and best management practices that the proponent could implement to minimize or offset potential adverse impacts.

Printed on Recycled Paper

TABLE OF CONTENTS

Page

List of Tables ix
List of Figures xiv
Acronyms xviii

1. PURPOSE OF AND NEED FOR ACTION 1-1
   1.1 Introduction 1-1
   1.2 Background 1-3
      1.2.1 Summary of BRAC 2005 Relevant to this SEIS 1-3
      1.2.2 7SFG(A) Relocation to Eglin AFB Summary 1-3
      1.2.3 Joint Strike Fighter (F-35) IJTS Summary 1-3
      1.2.4 Record of Decision Signed for 59 F-35 Aircraft and Limitation of Operations 1-5
      1.2.5 BRAC SEIS 1-6
      1.2.6 Updates Included in the Revised Draft SEIS 1-6
   1.3 Purpose of and Need for Action 1-12
   1.4 Environmental Impact Analysis Process 1-13
      1.4.1 Requirements 1-13
      1.4.2 Summary of Public Scoping Process 1-13
      1.4.3 Summary of Concerns Raised in the Public Scoping Process and Public Comment Period 1-13
      1.4.4 Summary of Comments Provided During the Draft SEIS Review and Comment Period 1-14
         1.4.4.1 Noise 1-16
         1.4.4.2 Adaptive Management, Mitigation, and Monitoring 1-19
         1.4.4.3 Children/Minorities 1-21
         1.4.4.4 Costs 1-21
         1.4.4.5 Domestic Animals 1-22
         1.4.4.6 Encroachment 1-22
         1.4.4.7 Flying Days and Late Night Operations 1-23
         1.4.4.8 Gulf Regional Airspace Strategic Initiative (GRASI) 1-23
         1.4.4.9 Maps 1-23
         1.4.4.10 Military Training Route Operations 1-24
         1.4.4.11 Public Comment Synopsis 1-25
         1.4.4.12 Supersonic Flight Information 1-25

2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES 2-1
   2.1 No Action Alternative 2-2
      2.1.1 Personnel 2-2
      2.1.2 Facilities/Infrastructure 2-3
      2.1.3 Air Operations 2-3
      2.1.4 Ordnance Use 2-4
   2.2 Proposed Action 2-5
      2.2.1 Personnel 2-6
      2.2.2 Facilities/Infrastructure 2-6

TABLE OF CONTENTS, CONT'D

Page

2.2.3 Air Operations....2-6
2.2.4 Ordnance Use....2-7
2.3 Alternatives....2-8
2.3.1 Initial Alternative Screening Process....2-9
2.3.1.1 Main Operating Base....2-9
2.3.1.2 Auxiliary Fields....2-14
2.3.1.3 Summary of Initial Screening Results....2-19
2.3.2 Alternatives Considered But Eliminated From Detailed Analysis....2-21
2.3.2.1 Alternatives Changed to Mitigations....2-21
2.3.2.2 Additional Alternatives Considered....2-21
2.3.2.3 Additional Analysis of Candidate Alternatives....2-21
2.3.2.4 Summary of Alternatives Considered but Eliminated From Detailed Analysis....2-36
2.3.3 Alternatives Carried Forward for JSF Beddown....2-37
2.3.4 Alternative 1: Eglin Main Base Alternative....2-38
2.3.4.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)....2-40
2.3.4.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field....2-40
2.3.5 Alternative 2: Duke Field Alternative....2-43
2.3.5.1 Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field....2-43
2.3.5.2 Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12....2-45
2.3.5.3 Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field....2-45
2.3.5.4 Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field....2-46
2.3.5.5 Alternative 2E – Duke Field Single Runway Plus Choctaw Field....2-46
2.4 Regulatory Compliance....2-46
2.4.1 Other Regulations and Permit Requirements....2-47
2.5 Environmental Comparison of Alternatives....2-49
2.6 Mitigation....2-70
2.6.1 Defining a Mitigation Measure....2-70
2.6.2 Resource-Specific Measures Proposed to Reduce the Potential for Environmental Impacts....2-71
2.6.3 Unavoidable Impacts....2-81

3. AFFECTED ENVIRONMENT....3-1
3.1 Introduction....3-1
3.2 Airspace....3-1
3.2.1 Definition....3-1
3.2.2 Background....3-1

TABLE OF CONTENTS, CONT'D

Page

3.2.3 Region of Influence ... 3-2
3.2.4 Analysis Methodology ... 3-6
3.2.5 Laws and Regulations ... 3-6
3.2.6 No Action Alternative Consequences ... 3-6
3.3 Noise ... 3-7
3.3.1 Definition ... 3-7
3.3.2 Region of Influence ... 3-8
3.3.3 Analysis Methodology ... 3-8
3.3.4 Laws and Regulations ... 3-13
3.3.5 No Action Alternative Consequences ... 3-13
3.4 Land Use ... 3-29
3.4.1 Definition ... 3-29
3.4.2 Region of Influence ... 3-29
3.4.3 Analysis Methodology ... 3-32
3.4.4 Laws and Regulations ... 3-32
3.4.5 No Action Alternative Consequences ... 3-33
3.5 Socioeconomics and Environmental Justice ... 3-41
3.5.1 Definition ... 3-41
3.5.2 Region of Influence ... 3-42
3.5.3 Analysis Methodology ... 3-42
3.5.4 Laws and Regulations ... 3-43
3.5.5 No Action Alternative Consequences ... 3-43
3.6 Transportation ... 3-52
3.6.1 Definition ... 3-52
3.6.2 Region of Influence ... 3-52
3.6.3 Analysis Methodology ... 3-54
3.6.4 Laws and Regulations ... 3-54
3.6.5 No Action Alternative Consequences ... 3-54
3.7 Utilities ... 3-60
3.7.1 Definition ... 3-60
3.7.2 Region of Influence ... 3-60
3.7.3 Analysis Methodology ... 3-63
3.7.4 Laws and Regulations ... 3-63
3.7.5 No Action Alternative Consequences ... 3-64
3.8 Air Quality ... 3-67
3.8.1 Definition ... 3-67
3.8.2 Region of Influence ... 3-70
3.8.3 Analysis Methodology ... 3-70
3.8.4 Laws and Regulations ... 3-71
3.8.5 No Action Alternative Consequences ... 3-74
3.9 Health and Safety ... 3-79
3.9.1 Definition ... 3-79

TABLE OF CONTENTS, CONT'D

Page

3.9.2 Region of Influence 3-79
3.9.3 Analysis Methodology 3-80
3.9.4 Laws and Regulations 3-80
3.9.5 No Action Alternative Consequences 3-80
3.10 Solid Waste 3-85
3.10.1 Definition 3-86
3.10.2 Region of Influence 3-86
3.10.3 Analysis Methodology 3-88
3.10.4 Laws and Regulations 3-89
3.10.5 No Action Alternative Consequences 3-90
3.11 Hazardous Materials and Wastes 3-93
3.11.1 Definition 3-93
3.11.2 Region of Influence 3-94
3.11.3 Analysis Methodology 3-101
3.11.4 Laws and Regulations 3-101
3.11.5 No Action Alternative Consequences 3-102
3.12 Physical Resources 3-106
3.12.1 Definition 3-106
3.12.2 Region of Influence 3-107
3.12.3 Analysis Methodology 3-107
3.12.4 Laws and Regulations 3-108
3.12.5 No Action Alternative Consequences 3-110
3.13 Biological Resources 3-112
3.13.1 Definition 3-112
3.13.2 Region of Influence 3-114
3.13.3 Analysis Methodology 3-116
3.13.4 Laws and Regulations 3-116
3.13.5 No Action Alternative Consequences 3-117
3.14 Cultural Resources 3-122
3.14.1 Definition 3-122
3.14.2 Region of Influence 3-123
3.14.3 Analysis Methodology 3-124
3.14.4 Laws and Regulations 3-124
3.14.5 No Action Alternative Consequences 3-126

4. ENVIRONMENTAL CONSEQUENCES 4-1
4.1 Introduction 4-1
4.2 Airspace 4-2
4.2.1 Commonalities Across All Alternatives 4-2
4.2.2 Mitigations 4-2
4.3 Noise 4-3
4.3.1 Commonalities Across All Alternatives 4-4
4.3.2 Alternative 1 – Eglin Main Base 4-8

TABLE OF CONTENTS, CONT'D

Page

4.3.2.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-8
4.3.2.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-21
4.3.3 Alternative 2 – Duke Field 4-31
4.3.3.1 Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field 4-31
4.3.3.2 Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin Runway 12 4-41
4.3.3.3 Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin Runway 12 and Choctaw Field 4-51
4.3.3.4 Alternative 2D – Duke Field Single Runway Plus Eglin Runway 12 and Choctaw Field 4-61
4.3.3.5 Alternative 2E – Duke Field Single Runway Plus Choctaw Field 4-72
4.3.3.6 Summary 4-81
4.3.4 Mitigations 4-82
4.4 Land Use 4-87
4.4.1 Alternative 1 – Eglin Main Base 4-87
4.4.1.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-87
4.4.1.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-91
4.4.2 Alternative 2 – Duke Field 4-96
4.4.2.1 Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field 4-96
4.4.2.2 Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12 4-102
4.4.2.3 Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field 4-107
4.4.2.4 Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field 4-113
4.4.2.5 Alternative 2E – Duke Field Single Runway Plus Choctaw Field 4-120
4.4.3 Mitigations 4-123
4.5 Socioeconomics and Environmental Justice 4-123
4.5.1 Alternative 1 – Eglin Main Base 4-124
4.5.1.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-124
4.5.1.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-131
4.5.2 Alternative 2 – Duke Field 4-136
4.5.2.1 Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field 4-136

TABLE OF CONTENTS, CONT'D

Page

4.5.2.2 Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12 4-143
4.5.2.3 Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field 4-149
4.5.2.4 Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field 4-154
4.5.2.5 Alternative 2E – Duke Field Single Runway Plus Choctaw Field 4-160
4.5.3 Mitigations 4-164
4.6 Transportation 4-166
4.6.1 Alternative 1 – Eglin Main Base 4-166
4.6.1.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-166
4.6.1.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-166
4.6.2 Alternative 2 – Duke Field 4-167
4.6.3 Summary of Improvements 4-172
4.6.4 Mitigations 4-177
4.7 Utilities 4-177
4.7.1 Alternative 1 – Eglin Main Base 4-177
4.7.2 Alternative 2 – Duke Field 4-177
4.7.3 Mitigations 4-182
4.8 Air Quality 4-183
4.8.1 Commonalities Across All Alternatives 4-183
4.8.2 Alternative 1 – Eglin Main Base 4-183
4.8.2.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-183
4.8.2.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-184
4.8.3 Alternative 2 – Duke Field 4-186
4.8.3.1 Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field 4-186
4.8.3.2 Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12 4-189
4.8.3.3 Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field 4-191
4.8.3.4 Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field 4-193
4.8.3.5 Alternative 2E – Duke Field Single Runway Plus Choctaw Field 4-196
4.8.4 Mitigations 4-198
4.9 Health and Safety 4-198
4.9.1 Alternative 1 – Eglin Main Base 4-199

TABLE OF CONTENTS, CONT'D

Page

4.9.1.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-199
4.9.1.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-200
4.9.2 Alternative 2 – Duke Field 4-202
4.9.2.1 Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field 4-202
4.9.2.2 Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12 4-204
4.9.2.3 Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field 4-205
4.9.2.4 Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field 4-205
4.9.2.5 Alternative 2E – Duke Field Single Runway Plus Choctaw Field 4-206
4.9.3 Mitigations 4-207
4.10 Solid Waste 4-207
4.10.1 Commonalities Across All Alternatives 4-207
4.10.2 Alternative 1 – Eglin Main Base 4-209
4.10.2.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-209
4.10.2.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-209
4.10.3 Alternative 2 – Duke Field 4-210
4.10.3.1 Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways 4-210
4.10.3.2 Alternatives 2D and 2E – Duke Field Single Runway 4-210
4.10.4 Mitigations 4-210
4.11 Hazardous Materials and Wastes 4-211
4.11.1 Commonalities Across All Alternatives 4-211
4.11.2 Alternative 1 – Eglin Main Base 4-212
4.11.2.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-212
4.11.2.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-212
4.11.3 Alternative 2 – Duke Field 4-212
4.11.3.1 Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways 4-212
4.11.3.2 Alternatives 2D and 2E – Duke Field Single Runway 4-214
4.11.4 Mitigations 4-214
4.12 Physical Resources 4-214
4.12.1 Commonalities Across All Alternatives 4-215
4.12.2 Alternative 1 – Eglin Main Base 4-217
4.12.2.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-217

TABLE OF CONTENTS, CONT'D

Page

4.12.2.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-217
4.12.3 Alternative 2 – Duke Field 4-225
4.12.3.1 Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways 4-225
4.12.3.2 Alternatives 2D and 2E – Duke Field Single Runway 4-231
4.12.4 Mitigations 4-231
4.13 Biological Resources 4-233
4.13.1 Commonalities Across All Alternatives 4-233
4.13.2 Alternative 1 – Eglin Main Base 4-235
4.13.2.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-235
4.13.2.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-236
4.13.3 Alternative 2 – Duke Field 4-246
4.13.3.1 Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways 4-246
4.13.3.2 Alternatives 2D and 2E – Duke Field Single Runway 4-262
4.13.4 Mitigations 4-266
4.14 Cultural Resources 4-268
4.14.1 Commonalities Across All Alternatives 4-268
4.14.2 Alternative 1 – Eglin Main Base 4-274
4.14.2.1 Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative) 4-274
4.14.2.2 Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field 4-274
4.14.3 Alternative 2 – Duke Field 4-274
4.14.3.1 Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways 4-275
4.14.3.2 Alternatives 2D and 2E – Duke Field Single Runway 4-275
4.14.4 Mitigations 4-275

5. CUMULATIVE EFFECTS AND OTHER ENVIRONMENTAL CONSIDERATIONS 5-1
5.1 Cumulative Effects 5-1
5.1.1 Introduction 5-1
5.1.2 Relevant Past and Present Actions 5-1
5.1.3 Reasonably Foreseeable Future Actions 5-2
5.1.3.1 Conceptual Actions or Proposals Not Considered Reasonably Foreseeable 5-6
5.1.4 Cumulative Effects Analysis 5-8
5.2 Other Environmental Considerations 5-22
5.2.1 Relationship Between Short-Term Uses and Long-Term Productivity 5-22
5.2.2 Irreversible and Irretrievable Commitment of Resources 5-24

TABLE OF CONTENTS, CONT'D

Page

6. LIST OF PREPARERS 6-1

7. REFERENCES 7-1

LIST OF APPENDICES

Appendix A Public Involvement
Appendix B Transportation
Appendix C Utilities
Appendix D Air Quality
Appendix E Noise
Appendix F Cultural Resources
Appendix G Physical Resources
Appendix H Biological Resources
Appendix I CZMA Determination
Appendix J Land Use
Appendix K Health and Safety

LIST OF TABLES

Page

Table 1-1. Comparison of Total F-35 Operations between the 2010 Draft SEIS and the 2013 SEIS 1-8
Table 1-2. Airspace Unit Comparison among the FEIS, Draft SEIS, and Revised Draft/Final SEIS.........1-10
Table 2-1. Estimated End State Maximum Daily Load of JSF IJTS Personnel at Eglin AFB.........................2-2
Table 2-2. Annual Air Traffic Control Operations Associated With the No Action Alternative 2-4
Table 2-3. Annual Ordnance Requirements for JSF Training for No Action Alternative 2-5
Table 2-4. Annual Ordnance Requirements for JSF Training – Proposed Action...2-8
Table 2-5. Airfields Considered for Use as an Auxiliary Field for JSF Training 2-19
Table 2-6. Candidate Alternatives Presented at SEIS Scoping Meetings 2-20
Table 2-7. Utility Infrastructure Under Proposed Runway – Alternative 1B 2-26
Table 2-8. Summary of Candidate Alternatives Eliminated from Detailed Analysis 2-36
Table 2-9. Alternatives Carried Forward for Detailed Analysis..2-37
Table 2-10. Annual Air Traffic Control Operations Associated With Alternative 1...................................2-40
Table 2-11. Annual Air Traffic Control Operations Associated With Alternative 2A................................2-45
Table 2-12. Annual Air Traffic Control Operations Associated With Alternative 2B 2-45
Table 2-13. Annual Air Traffic Control Operations Associated With Alternative 2C................................2-45
Table 2-14. Annual Air Traffic Control Operations Associated With Alternative 2D................................2-46
Table 2-15. Annual Air Traffic Control Operations Associated With Alternative 2E 2-46
Table 2-16. Applicable Permits/Regulations and Potential Permit Changes Due to BRAC Decisions 2-48
Table 2-17. Potential Impacts from the Implementation of the JSF Beddown Construction and Ground Operation Activities 2-50
Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training 2-58
Table 2-19. Potential Mitigations or Management Measures...2-72
Table 3-1. Existing Regional Airspace...3-5
Table 3-2. Average NIPTS and 10th Percentile NIPTS as a Function of DNL 3-11
Table 3-3. Afterburner Departures and "Late Night" Flying Operations (10:00 PM – 7:00 AM) Under the No Action Alternative 3-13
Table 3-4. Acreage, Population, and Residential Parcels Affected by Elevated Noise Levels Under the No Action Alternative 3-14
Table 3-5. Representative Noise-Sensitive Receptors Under the No Action Alternative 3-21
Table 3-6. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Base Under the No Action Alternative..3-23
Table 3-7. Subsonic (L_{dnmr}) and Supersonic (CDNL) Noise Levels and Percent Population Highly Annoyed Beneath Training Airspace Under the No Action Alternative................................3-24

LIST OF TABLES, CONT'D

Page

Table 3-8. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under the No Action Alternative....3-28
Table 3-9. Residential/Urban Area Associated with Training Airspace Units....3-31
Table 3-10. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – No Action Alternative....3-37
Table 3-11. Potential Socioeconomic Impacts of the No Action Alternative in the Region of Influence....3-45
Table 3-12. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under the No Action Alternative....3-48
Table 3-13. Affected Populations of Concern Near Eglin Main Base, No Action Alternative....3-49
Table 3-14. No Action Alternative 2016 Peak-Hour, Peak-Direction Level of Service Analysis....3-55
Table 3-15. No Action Alternative 2021 Peak-Hour, Peak-Direction Level of Service Analysis....3-56
Table 3-16. Permitted and Actual Potable Water Use on Eglin Main Base....3-60
Table 3-17. Wastewater Treatment Plant Capacities....3-62
Table 3-18. Electricity Consumption from 2000–2011 for Eglin AFB[1]....3-62
Table 3-19. Natural Gas Consumption from 2000–2011 for Eglin AFB[1]....3-63
Table 3-20. No Action Alternative: Housing Area Water System Capacity....3-65
Table 3-21. No Action Alternative: Estimated Wastewater Flow....3-66
Table 3-22. No Action Alternative: WWTP Capacity....3-67
Table 3-23. No Action Alternative: Electric and Natural Gas Annual Consumption....3-67
Table 3-24. Emissions Inventory for Okaloosa, Santa Rosa, Walton, Escambia, and Bay Counties....3-70
Table 3-25. Estimated Construction Air Emissions Under the No Action Alternative....3-74
Table 3-26. Percentage of Construction and Additional Personnel Emissions Associated With the No Action Alternative Compared With the Region of Influence....3-75
Table 3-27. Aircraft Emissions by F-35 Configuration for No Action Alternative....3-76
Table 3-28. No Action Alternative Aircraft Maintenance and Auxiliary Ground Equipment....3-77
Table 3-29. Aircraft Emissions Associated With No Action Alternative Compared With the Region of Influence....3-77
Table 3-30. No Action Alternative Munitions Emissions....3-78
Table 3-31. Estimated Emissions from 25-mm Ammunition and Flares for No Action Alternative Strafing Run Training....3-78
Table 3-32. Summary of No Action Alternative Air Emissions....3-79
Table 3-33. JSF IJTS – Munitions Storage/Maintenance Facilities....3-81
Table 3-34. Eglin AFB Projected Frequency of Class A Mishaps Associated With JSF Training....3-84
Table 3-35. Solid Waste Collected in Okaloosa, Santa Rosa, and Walton Counties (tons)....3-87
Table 3-36. Active ERP Sites Located Within or Adjacent to No Action Alternative....3-98
Table 3-37. TRI-DDS Surrogates Used in the Analysis....3-104
Table 3-38. Munitions-related Wastes – No Action Alternative....3-105
Table 3-39. Federally Listed Mammalian Species Present Under Non-Eglin-Owned Airspace Units....3-119
Table 3-40. Federally Listed Airborne Species Present Under Non-Eglin-Owned Airspace Units....3-119
Table 4-1. Afterburner Departures and "Late Night" Flying Operations (10:00 PM - 7:00 AM) Under Alternative 1A (Preferred Alternative)....4-8
Table 4-2. Acreage and Population Affected by Noise Contours Under Alternative 1A (Preferred Alternative) in the Vicinity of Airfields....4-9
Table 4-3. Off-Installation Population Exposed to Noise Levels that Could Result in NIPTS Under Alternative 1A (Preferred Alternative)....4-13
Table 4-4. Representative Noise-Sensitive Receptors Under Alternative 1A (Preferred Alternative)[1]....4-16
Table 4-5. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 1A (Preferred Alternative)[1]....4-19

LIST OF TABLES, CONT'D

Page

Table 4-6. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 1A 4-20
Table 4-7. Afterburner Departures and "Late Night" Flying Operations (10:00 PM - 7:00 AM) Under Alternative 1I 4-21
Table 4-8. Acreage and Population Affected by Elevated Noise Levels Under Alternative 1I in the Vicinity of Airfields 4-26
Table 4-9. Representative Noise-Sensitive Receptors Under Alternative 1I[1] 4-28
Table 4-10. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 1I[1] 4-29
Table 4-11. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 1I 4-30
Table 4-12. Afterburner Departures and "Late Night" Flying Operations (10:00 PM - 7:00 AM) Under Alternative 2A 4-31
Table 4-13. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2A 4-35
Table 4-14. Representative Noise-Sensitive Receptors Under Alternative 2A[1] 4-37
Table 4-15. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2A[1] 4-39
Table 4-16. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2A 4-40
Table 4-17. Afterburner Departures and "Late Night" Flying Operations (10:00 PM - 7:00 AM) Under Alternative 2B 4-41
Table 4-18. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2B....4-45
Table 4-19. Off-Installation Population Exposed to Noise Levels that Could Result in NIPTS Under Alternative 2B 4-47
Table 4-20. Representative Noise-Sensitive Receptors Under Alternative 2B[1] 4-47
Table 4-21. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2B[1] 4-49
Table 4-22. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2B 4-50
Table 4-23. Afterburner Departures and "Late Night" Flying Operations (10:00 PM–7:00 AM) Under Alternative 2C 4-51
Table 4-24. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2C 4-55
Table 4-25. Off-Installation Population Exposed to Noise Levels that Could Result in NIPTS Under Alternative 2C 4-57
Table 4-26. Representative Noise-Sensitive Receptors Under Alternative 2C[1] 4-58
Table 4-27. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2C[1] 4-59
Table 4-28. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2C....4-60
Table 4-29. Afterburner Departures and "Late Night" Flying Operations (10:00 PM–7:00 AM) Under Alternative 2D....4-61
Table 4-30. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2D 4-62
Table 4-31. Off-Installation Population Exposed to Noise Levels that Could Result in NIPTS Under Alternative 2D....4-66
Table 4-32. Representative Noise-Sensitive Receptors Under Alternative 2D[1] 4-68
Table 4-33. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2D[1] 4-70
Table 4-34. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2D 4-71

LIST OF TABLES, CONT'D

Page

Table 4-35. Afterburner Departures and "Late Night" Flying Operations (During 10:00 PM–7:00 AM) Under Alternative 2E 4-72
Table 4-36. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2E....4-76
Table 4-37. Representative Noise-Sensitive Receptors Under Alternative 2E[1] 4-78
Table 4-38. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2E[1]....4-80
Table 4-39. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2E....4-80
Table 4-40. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main 4-82
Table 4-41. Number of Off-base Acres Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main....4-82
Table 4-42. Alternative 1A (Preferred Alternative) – Eglin Main Off-base Land Use 4-91
Table 4-43. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 1I....4-96
Table 4-44. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2A 4-100
Table 4-45. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2B....4-107
Table 4-46. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2C 4-110
Table 4-47. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2D 4-117
Table 4-48. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2E....4-123
Table 4-49. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 1A (Preferred Alternative) 4-126
Table 4-50. Affected Populations of Concern, Alternative 1A (Preferred Alternative)....4-129
Table 4-51. Number of Residents Potentially Affected by Aircraft Noise Under Alternative 1I....4-131
Table 4-52. Affected Populations of Concern in the Vicinity of Eglin Air Force Base, Alternative 1I....4-133
Table 4-53. Number of Residents Potentially Affected Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 2A....4-137
Table 4-54. Affected Populations of Concern, Alternative 2A....4-139
Table 4-55. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 2B 4-143
Table 4-56. Affected Populations of Concern, Alternative 2B 4-145
Table 4-57. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 2C....4-149
Table 4-58. Affected Populations of Concern, Alternative 2C....4-151
Table 4-59. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 2D....4-154
Table 4-60. Affected Populations of Concern, Alternative 2D....4-157
Table 4-61. Number of Residents Potentially Affected by Aircraft Noise Under Alternative 2E....4-160
Table 4-62. Affected Populations of Concern, Alternative 2E 4-163
Table 4-63. Alternative 2 in 2016 – Deficient Segments and Significant Impacts to Level of Service....4-167
Table 4-64. Alternative 2 in 2021 – Deficient Segments and Significant Impacts to Level of Service....4-169
Table 4-65. 2016 – Deficiencies and Recommended Improvements 4-173
Table 4-66. 2021 – Deficiencies and Recommended Improvements 4-174

LIST OF TABLES, CONT'D

Page

Table 4-67. Permitted and Actual Potable Water Use on Duke Field 4-179
Table 4-68. Alternative 2: Potable Water Usage..4-179
Table 4-69. Duke Wastewater Treatment Plant Capacities 4-180
Table 4-70. Alternative 2: Estimated Wastewater Flows at Eglin Main and Duke Field 4-181
Table 4-71. Alternative 2: Wastewater Treatment Plant Capacity 4-181
Table 4-72. Alternative 2: Electric and Natural Gas Annual Consumption..4-182
Table 4-73. Alternative 1A (Preferred Alternative) – Munitions Emissions 4-183
Table 4-74. Summary of Alternative 1A (Preferred Alternative) – Air Emissions...............................4-184
Table 4-75. Estimated Construction Air Emissions Under Alternative 1I 4-185
Table 4-76. Percentage of Construction and Additional Personnel Emissions Associated With Alternative 1I Compared With the Region of Influence 4-185
Table 4-77. Summary of Alternative 1I Air Emissions...4-186
Table 4-78. Estimated Construction Air Emissions Under Alternative 2A..4-187
Table 4-79. Percentage of Construction and Additional Personnel Emissions Associated With Alternative 2A Compared With the Region of Influence..4-187
Table 4-80. Aircraft Emissions by F-35 Configuration – Alternative 2A 4-188
Table 4-81. Aircraft Emissions Associated With Alternative 2A Compared With the Region of Influence 4-188
Table 4-82. Summary of Alternative 2A Air Emissions...4-189
Table 4-83. Aircraft Emissions by F-35 Configuration – Alternative 2B...4-190
Table 4-84. Aircraft Emissions Associated With Alternative 2B Compared With the Region of Influence 4-190
Table 4-85. Summary of Alternative 2B Air Emissions 4-191
Table 4-86. Aircraft Emissions by F-35 Configuration – Alternative 2C 4-192
Table 4-87. Aircraft Emissions Associated With Alternative 2C Compared With the Region of Influence 4-192
Table 4-88. Summary of Alternative 2C Air Emissions 4-193
Table 4-89. Estimated Construction Air Emissions Under Alternative 2D...4-194
Table 4-90. Percentage of Construction and Additional Personnel Emissions Associated With Alternative 2D Compared With the Region of Influence..4-194
Table 4-91. Aircraft Emissions by F-35 Configuration – Alternative 2D 4-195
Table 4-92. Aircraft Emissions Associated With Alternative 2D Compared With the Region of Influence 4-195
Table 4-93. Summary of Alternative 2D Air Emissions...4-196
Table 4-94. Aircraft Emissions by F-35 Configuration – Alternative 2E...4-197
Table 4-95. Aircraft Emissions Associated With Alternative 2E Compared With the Region of Influence 4-197
Table 4-96. Summary of Alternative 2E Air Emissions 4-198
Table 4-97. Debris from Annual Munitions Use..4-208
Table 4-98. Munitions-related Wastes for All Action Alternatives 4-211
Table 4-99. Active ERP Sites Located Within or Adjacent to Alternative 2 4-213
Table 4-100. Alternative 1I – Soils Type and Attributes 4-218
Table 4-101. Modeled Alternative 1I Single Runway Pre- and Post-Construction Stormwater Runoff Conditions..4-223
Table 4-102. Alternatives 2A, 2B, and 2C – Soils Types and Attributes 4-225
Table 4-103. Modeled Alternative 2 Duke Field Main Operating Base Pre- and Post-Construction Stormwater Runoff Conditions 4-230
Table 4-104. Modeled Alternatives 2A, 2B, and 2C Parallel Runway and LHA Pre- and Post-Construction Stormwater Runoff Conditions 4-231

LIST OF TABLES, CONT'D

Page

Table 4-105. Acreage of Ecological Associations Found Within the Alternative 1I Project Area 4-238
Table 4-106. Eglin Main Base – Sensitive Species Potentially Occurring In or Near the Alternative 1I Project Area 4-238
Table 4-107. Acreage of Ecological Associations Found Within the Alternative 2 Project Areas 4-246
Table 4-108. Sensitive Species Within or Adjacent to the Alternative 2 Project Areas 4-250
Table 4-109. Results for Foraging Habitat Analysis 4-260
Table 4-110. Eligible Historic Structures (Non-Historic District) Within Greater Than 65 dB DNL Noise Contours on Eglin Main Base 4-272
Table 5-1. Noise in Proposed MHPI Eglin Main Alternative Areas Under Proposed SEIS Alternative 1A 5-9
Table 5-2. Acres of Military Housing Privatization Initiative (MHPI) Impacted by Noise Levels Greater Than 65 dB DNL Under SEIS Alternatives 5-9
Table 5-3. Potential Cumulative Impact on Wastewater Treatment Plant Capacity 5-15
Table 5-4. Potential Cumulative Impact on Permitted Levels of Eglin Main Base Potable Water Systems 5-15

LIST OF FIGURES

Page

Figure 2-1. Potential Airfield Alternatives 2-10
Figure 2-2. Potential Airfields and Range Hazard Areas 2-12
Figure 2-3. Potential Auxiliary Fields Within 50 NM of Eglin Main Base 2-16
Figure 2-4. Potential Auxiliary Fields Within 50 NM of Duke Field 2-17
Figure 2-5. Potential Auxiliary Fields Within 50 NM of Choctaw Field 2-18
Figure 2-6. Alternative 1B – Proposed Runway Location with Topography 2-24
Figure 2-7. Utilities at Eglin Main Base and Alternative 1B Areas 2-25
Figure 2-8. Alternative 1 – Parallel Runways at Eglin Main Base 2-27
Figure 2-9. Alternatives 1C, 1D, and 1E Proposed Runway with Topography 2-28
Figure 2-10. Alternative 1H – Runway 19 with Topography 2-30
Figure 2-11. Alternatives 3A, 3B, and 3C – Initially Proposed Runway and Topography 2-31
Figure 2-12. Alternatives 3A, 3B, and 3C – Choctaw Field Dual Runways, "V" Configuration..........2-32
Figure 2-13. Alternatives 3A, 3B, and 3C – "V" Configuration Runway and Topography..........2-33
Figure 2-14. Aerial View of Eglin Main Base and Existing Runway – Alternative 1A (Preferred Alternative) 2-39
Figure 2-15. Notional Location of Alternative 1I Runway Construction 2-41
Figure 2-16. Alternative 1I – Proposed Runway with Topography..........2-42
Figure 2-17. Notional Location of Alternatives 2A, 2B, and 2C Runway and LHA Construction 2-44
Figure 3-1. Location of Existing Regional Military Airspace Units 3-4
Figure 3-2. Noise Contours from F-35 and All Other Aircraft at Eglin Main, Duke Field, and Choctaw Field Under the No Action Alternative 3-15
Figure 3-3. Noise Contours from F-35 and All Other Aircraft Under the No Action Alternative in the Vicinity of Eglin Main Base 3-16
Figure 3-4. Noise Contours from 2006 AICUZ Study and F-35 and All Other Aircraft Under the No Action Alternative in the Vicinity of Eglin Main Base 3-17
Figure 3-5. Potential Hearing Loss Risk Areas Under the No Action Alternative 3-19
Figure 3-6. Location of Representative Noise-Sensitive Locations 3-20
Figure 3-7. High-Explosives Munitions Noise (CDNL) Under the No Action Alternative..........3-27
Figure 3-8. On-base Land Use at Eglin AFB – No Action Alternative..........3-34

LIST OF FIGURES, CONT'D

Page

Figure 3-9. On-base Land Use at Duke Field – No Action Alternative 3-35
Figure 3-10. On-base Land Use at Choctaw Field – No Action Alternative 3-36
Figure 3-11. Off-base Land Use near Eglin Main – No Action Alternative 3-38
Figure 3-12. Off-base Land Use near Duke Field – No Action Alternative 3-39
Figure 3-13. Off-base Land Use near Choctaw Field – No Action Alternative 3-40
Figure 3-14. Minority and Low-Income Populations – No Action Alternative...3-50
Figure 3-15. Schools and Daycares – No Action Alternative 3-51
Figure 3-16. Roadway Segments (and Level of Service) as of 2008 in the Region of Influence 3-53
Figure 3-17. No Action Alternative – 2016 Roadway Peak-Hour Peak-Direction LOS..............................3-58
Figure 3-18. No Action Alternative – 2021 Roadway Peak-Hour Peak-Direction LOS..............................3-59
Figure 3-19. Eglin Main Utilities 3-61
Figure 3-20. ERP Sites Within or Adjacent to Eglin Main Base 3-97
Figure 3-21. Water Resources – No Action Alternative..3-111
Figure 3-22. Eglin Main Base – Ecological Associations...3-113
Figure 3-23. Sensitive Habitats and Sensitive Species – Eglin Main Base..3-115
Figure 3-24. Limited Suppression Areas..3-121
Figure 4-1. High-Explosives Munitions Noise (CDNL) Under All Action Alternatives 4-5
Figure 4-2. Tyndall AFB Noise Contours 4-7
Figure 4-3. Noise Contours from F-35 and All Other Aircraft Under Alternative 1A (Preferred Alternative) in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field 4-10
Figure 4-4. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Eglin Main Under Alternative 1A (Preferred Alternative)...4-11
Figure 4-5. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Eglin Main Under Alternative 1A (Preferred Alternative) and the No Action Alternative 4-12
Figure 4-6. Potential Hearing Loss Risk Areas Under Alternative 1A (Preferred Alternative) from F-35 and All Other Aircraft 4-14
Figure 4-7. Noise Contours from F-35 and All Other Aircraft Under Alternative 1I in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field 4-22
Figure 4-8. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Eglin Main Under Alternative 1I 4-23
Figure 4-9. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Eglin Main Under Alternative 1I and the No Action Alternative 4-24
Figure 4-10. Potential Hearing Loss Risk Areas Under Alternative 1I from F-35 and All Other Aircraft..4-25
Figure 4-11. Noise Contours from F-35 and All Other Aircraft Under Alternative 2A in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field 4-32
Figure 4-12. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2A...4-33
Figure 4-13. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2A and the No Action Alternative 4-34
Figure 4-14. Potential Hearing Loss Risk Areas Under Alternative 2A from F-35 and All Other Aircraft..4-36
Figure 4-15. Noise Contours from F-35 and All Other Aircraft Under Alternative 2B in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field 4-42
Figure 4-16. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2B 4-43
Figure 4-17. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2B and the No Action Alternative 4-44

LIST OF FIGURES, CONT'D

Page

Figure 4-18. Potential Hearing Loss Risk Areas Under Alternative 2B from F-35 and All Other Aircraft 4-46
Figure 4-19. Noise Contours from F-35 and All Other Aircraft Under Alternative 2C in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field 4-52
Figure 4-20. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2C 4-53
Figure 4-21. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2C and the No Action Alternative 4-54
Figure 4-22. Potential Hearing Loss Risk Under Alternative 2C from F-35 and All Other Aircraft....4-56
Figure 4-23. Noise Contours from F-35 and All Other Aircraft Under Alternative 2D in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field 4-63
Figure 4-24. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2D 4-64
Figure 4-25. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2D and the No Action Alternative 4-65
Figure 4-26. Potential Hearing Loss Risk Areas Under Alternative 2D from F-35 and All Other Aircraft 4-67
Figure 4-27. Noise Contours from F-35 and All Other Aircraft Under Alternative 2E in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field 4-73
Figure 4-28. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2E 4-74
Figure 4-29. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2E and the No Action Alternative 4-75
Figure 4-30. Potential Hearing Loss Risk Areas Under Alternative 2E from F-35 and All Other Aircraft 4-77
Figure 4-31. On-base Land Use – Alternative 1A (Preferred Alternative) (Eglin) 4-89
Figure 4-32. Land Use Off-base (Eglin) – Alternative 1A (Preferred Alternative) 4-90
Figure 4-33. Recreation Units On-base (Eglin) – Alternative 1I 4-92
Figure 4-34. On-base Land Use – Alternative 1I (Eglin) 4-94
Figure 4-35. Land Use Off-base (Eglin) – Alternative 1I 4-95
Figure 4-36. Recreation Units On-base (Duke Field) – Alternatives 2A, 2B, and 2C 4-97
Figure 4-37. On-base Land Use – Alternative 2A (Duke Field) 4-99
Figure 4-38. Land Use Off-base (Duke Field) – Alternative 2A 4-101
Figure 4-39. On-base Land Use – Alternative 2B (Duke Field) 4-103
Figure 4-40. On-base Land Use – Alternative 2B (Eglin) 4-104
Figure 4-41. Land Use Off-base (Duke Field) – Alternative 2B 4-105
Figure 4-42. Land Use Off-base (Eglin) – Alternative 2B 4-106
Figure 4-43. On-base Land Use – Alternative 2C (Duke Field) 4-108
Figure 4-44. On-base Land Use – Alternative 2C (Eglin) 4-109
Figure 4-45. Land Use Off-base (Duke Field) – Alternative 2C 4-111
Figure 4-46. Land Use Off-base (Eglin) – Alternative 2C 4-112
Figure 4-47. Recreation Units On-base (Duke Field) – Alternatives 2D and 2E 4-114
Figure 4-48. On-base Land Use – Alternative 2D (Duke Field) 4-115
Figure 4-49. On-base Land Use – Alternative 2D (Eglin) 4-116
Figure 4-50. Land Use Off-base (Duke Field) – Alternative 2D 4-118
Figure 4-51. Land Use Off-base (Eglin) – Alternative 2D 4-119
Figure 4-52. On-base Land Use – Alternative 2E (Duke Field) 4-121
Figure 4-53. Land Use Off-base (Duke Field) – Alternative 2E 4-122
Figure 4-54. Minority and Low-Income Populations, Alternative 1A (Preferred Alternative) 4-128

LIST OF FIGURES, CONT'D

Page

Figure 4-55. Schools and Daycares, Alternative 1A (Preferred Alternative) 4-130
Figure 4-56. Minority and Low-Income Populations, Alternative 1I....4-134
Figure 4-57. Schools and Daycares, Alternative 1I....4-135
Figure 4-58. Minority and Low-Income Populations, Alternative 2A....4-140
Figure 4-59. Schools and Daycares, Alternative 2A 4-142
Figure 4-60. Minority and Low-Income Populations, Alternative 2B 4-146
Figure 4-61. Schools and Daycares, Alternative 2B....4-148
Figure 4-62. Minority and Low-Income Populations, Alternative 2C....4-152
Figure 4-63. Schools and Daycares, Alternative 2C 4-153
Figure 4-64. Minority and Low-Income Populations, Alternative 2D....4-156
Figure 4-65. Schools and Daycares, Alternative 2D 4-159
Figure 4-66. Minority and Low-Income Populations, Alternative 2E 4-162
Figure 4-67. Schools and Daycares, Alternative 2E....4-165
Figure 4-68. Duke Field Utilities....4-178
Figure 4-69. Soils Within Alternative 1I Project Area 4-219
Figure 4-70. Water Resources – Alternative 1I....4-220
Figure 4-71. Soils Within Alternatives 2A, 2B, 2C, 2D, and 2E Project Areas....4-226
Figure 4-72. Water Resources – Alternative 2....4-228
Figure 4-73. Ecological Associations Found on or Near Alternative 1I Project Area 4-237
Figure 4-74. Alternatives 1A and 1I – Sensitive Habitats....4-239
Figure 4-75. Sensitive Species Found on or Near the Alternative 1A (Preferred Alternative) and Alternative 1I Project Areas 4-241
Figure 4-76. Ecological Associations Found on or Near the Alternative 2 Project Areas 4-247
Figure 4-77. Sensitive Habitats Found on or Near the Alternative 2 Project Areas....4-248
Figure 4-78. Sensitive Species Found on or Near the Alternative 2 Project Areas....4-251
Figure 4-79. Detailed Foraging Habitat Model Results 4-257
Figure 5-1. MHPI Eglin Main Alternative Parcels and Noise Contours Under Alternative 1A (Preferred Alternative)....5-10

ACRONYMS

<	less than
>	greater than
≥	greater than or equal to
1 SOMXS	Maintenance Squadron
6 SOS	6th Special Operations Squadron
7SFG(A)	7th Special Forces Group (Airborne)
9 SOS	9th Special Operations Squadron
33 FW	33rd Fighter Wing
46 TW	46th Test Wing (now known as 96th Test Wing)
96 CEG	96th Civil Engineer Group
96 TW	96th Test Wing (includes former 46 TW)
711 SOS	711th Special Operations Squadron
728 ACS	728th Air Control Squadron
919 SOW	919th Special Operations Wing
A/C	Aircraft
AAC	Air Armament Center
AACI	Air Armament Center Instruction
AAS	aquifer air sparge
ACC	Air Combat Command
ACM	asbestos-containing materials
AETC	Air Education and Training Command
AFB	Air Force Base
AFH	Air Force Handbook
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection, and Health
AFPD	Air Force Planning Directive
AFSOC	Air Force Special Operations Command
AGE	auxiliary ground equipment
AGL	above ground level
AICUZ	Air Installation Compatible Use Zones
ALARNG	Alabama Army National Guard
Alt	Alternative
AMU	aircraft maintenance unit
ANSI	American National Standards Institute
AOC	Area of Concern
APE	area of potential effect
APZ	Accident Potential Zone
AST	aboveground storage tank
ATCAA	Air Traffic Control assigned airspace
AvFID	Aviation Foreign Internal Defense
AvFID FW	Aviation Foreign Internal Defense Fixed Wing aircraft
BAG	Basic Air-to-Ground
BASH	bird/wildlife-aircraft strike hazard
blk	block
Blvd	Boulevard
BMP	best management practice

ACRONYMS, CONT'D

BOOMAP	sonic boom noise modeling software
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, and xylenes (a petroleum contaminant)
C&D	construction and demolition
CAA	Clean Air Act
CAR	contamination assessment report
CAS	Close Air Support
CDNL	C-weighted day-night average noise level
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFCs	chlorofluorocarbons
CFR	Code of Federal Regulations
CH_4	methane
CHABA	Committee on Hearing, Bioacoustics and Biomechanics
CHLOE	name of an aircraft approach fix
CMI	Corrective Measures Implementation
CMS	Congestion Management System
CO	carbon monoxide
CO_2	carbon dioxide
CO_2-e	carbon dioxide equivalent
CRIMS	Cultural Resources Information Management System
CTG	cartridge
CTOL	conventional take-off and landing
CV	carrier variant
CWA	Clean Water Act
CY	calendar year
CZ	clear zone
CZMA	Coastal Zone Management Act
dB	decibels
dBA	A-weighted decibels
DCA	Florida Department of Community Affairs
Demo	demolish
DERP	Defense ERP (Environmental Restoration Program)
Dir	direction
DNL	day-night average sound level
DoD	Department of Defense
DODIC	Department of Defense Identification Code
DOI	Department of the Interior
DRIs	Developments of Regional Impacts
E	endangered
EAFBI	Eglin Air Force Base Instruction
ECTRC	Emerald Coast Technology and Research Center
EGTTR	Eglin Gulf Test and Training Range
EIS	Environmental Impact Statement
EO	Executive Order
EOD	explosive ordnance disposal

ACRONYMS, CONT'D

EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESP	Explosive Site Plan
ESQD	explosive safety quantity distance
F-22 EA	*F-22 Operational Squadron and T-38A Detachment Beddown at Tyndall Air Force Base, Florida, Environmental Assessment*
F-35	Joint Strike Fighter aircraft
FAA	Federal Aviation Administration
FAC	Florida Administrative Code
FCLP	Field Carrier Landing Practice
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FE	federally endangered
February 2009 ROD	"Record of Decision, Implementation of Base Realignment and Closure (BRAC) 2005 Decisions for the Joint Strike Fighter (JSF) Initial Joint Training Site (IJTS), Eglin AFB, Florida," dated February 5, 2009
FEIS	*Proposed Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions at Eglin AFB, FL Final Environmental Impact Statement*, dated October 2008
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FMS	Foreign Military Sales
FNAI	Florida Natural Areas Inventory
FONSI	Finding of No Significant Impact
FT	federally threatened
ft	feet
ft^2	square feet
ft^3/s	cubic feet per second
FWC	Florida Fish and Wildlife Conservation Commission
FY	fiscal year
gal	gallons
gal/day	gallons per day
GBU	guided bomb unit
GCTL	groundwater contaminant threshold level
GHG	greenhouse gas
GIS	geographic information system
GPS	global positioning system
GRASI	Gulf Regional Airspace Strategic Initiative
GWP	global warming potential
HAP	hazardous air pollutant
HC	hydrocarbon
HHRA	human health risk assessment
HQ	Headquarters
HQNC	High Quality Natural Communities
Hr	hour
Hwy	Florida Highway

ACRONYMS, CONT'D

I-10	Interstate 10
IAP	Initial Approach Pattern
ICM	Interim Corrective Measure
IFR	instrument flight rules
IJTS	Initial Joint Training Site
ILLUM	Illuminating
ILS	Instrument Landing System
IMPLAN	an economic impact modeling program
INRMP	Integrated Natural Resources Management Plan
IR	instrument route (instrument flight rules)
IR CM	Infrared Countermeasure
JDAM	Joint Direct Attack Munitions
JP	jet propellant
JPO	Joint Program Office
JSF	Joint Strike Fighter
kWh	kilowatt hours
LB or lb	pounds
LBP	lead-based paint
lbs/ft^2	pounds per square foot
L_{dnmr}	onset-rate adjusted monthly day-night average sound level
L_{eq}	equivalent sound level
LHA	Landing Helicopter Amphibious
L_{max}	maximum sound level
LOS	level of service
MBTA	Migratory Bird Treaty Act
MCF	million cubic feet
mgd	million gallons per day
MHPI	Military Housing Privatization Initiative
MHPI FEIS	*Final Environmental Impact Statement for the Military Housing Privatization Initiative (MHPI) at Eglin AFB and Hurlburt Field, Florida*
MILCON	Military Construction
MJU	munitions countermeasures unit
MK or Mk	mark
Mm	millimeter
MNA	monitored natural attenuation
MOA	military operating area
MOB	Main Operating Base
MR_NMAP	aircraft operations noise modeling software
MRTFB	Major Range Test Facility Base
MSA	munitions storage area
MSANG	Mississippi Air National Guard
MSL	(above) mean sea level
MSW	municipal solid waste
MTR	military training route
MU	Management Unit
n/a	not applicable

ACRONYMS, CONT'D

N_2O	nitrous oxide
NA	natural attenuation
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NFA	no further action
NHPA	National Historic Preservation Act
NIPTS	Noise-Induced Permanent Threshold Shift
NLR	noise level reduction
NM	nautical miles
NM^2	square nautical miles
NOISEFILE	a database containing data used in noise modeling
NOISEMAP	a noise analysis computer model
NOLF	Navy Outlying Field
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRS	Natural Resources Section
N-S	North-South
NSN	National Stock Number
NW-SE	Northwest-Southeast
O&M	operations and maintenance
O_3	ozone
OCWSD	Okaloosa County Water and Sewer Department
ºF	degrees Fahrenheit
OLF	outlying field
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer
PAA	Primary Aerospace Vehicle Authorized
PAH	polycyclic aromatic hydrocarbon (a petroleum contaminant)
PCBs	polychlorinated biphenyls
PHL	potential hearing loss
PIAF	Practice Instrument Approach Fields
Pk	peak
PK_{15}(met)	Peak Noise Exceeded by 15 Percent of Firing Events
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 microns
POI	point of interest
POL	petroleum, oil, or lubricant
PRAC	practice
PSD	Prevention of Significant Deterioration
R-	Restricted Area
RA	Remedial Action
RAP	remedial action plan
RCNM	construction noise modeling software

ACRONYMS, CONT'D

RCRA	Resource Conservation and Recovery Act
RCW	red-cockaded woodpecker
Rd	Road
RME	reasonable maximum exposure
ROD	Record of Decision
ROI	region of influence
RW	Runway
SAC	Strategic Air Command
SAR	Site Assessment Report
SE	state endangered
SEIS	Supplemental Environmental Impact Statement
SEL	sound exposure level
SHPO	State Historic Preservation Officer
SID	standard instrument departure
SIS	Strategic Intermodal System
SO_2	sulfur dioxide
SOAWC	Air Force Special Operations Air Warfare Center
SO_x	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasures
Sqd Ops/AMU	squadron operations/aircraft maintenance unit
SSC	state species of special concern
ST	state threatened
ST-##	Environmental Restoration Program Site Number
STAR	standard terminal arrival route
STC	sound transmission class
STEMM	Science, Technology, Engineering, Mathematics, and Medical
STOVL	short take-off vertical landing
SUA	special use airspace
SVE	soil vapor extraction
SWPPP	Storm Water Pollution Prevention Plan
T	threatened
T&E	threatened and endangered
TA	Test Area
THPO	Tribal Historic Preservation Officer
TMDL	Total Maximum Daily Load
TP	target practice
TPO	Transportation Planning Organization
TP-T	target practice-tracer
tpy	tons per year
TRI	Toxics Release Inventory
TRI-DDS	Toxics Release Inventory-Data Delivery System
TRPH	total recoverable petroleum hydrocarbons
TSM	Transportation System Management
TT	training target
U.S.	United States
UAS	Unmanned Aerial System

ACRONYMS, CONT'D

UF-REEF	University of Florida Research and Engineering Education Facility
UK	United Kingdom
US ##	U.S. Highway ## (e.g., US 98)
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
UXO	unexploded ordnance
v/c	volume to capacity
VFR	visual flight rules
VOC	volatile organic compound
Vol	volume
VR	visual route (visual flight rules)
W-	Warning Area
WFRPC	West Florida Regional Planning Council
WRF	Water Reclamation Facility
WWTP	wastewater treatment plant

1. PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

The Air Force's "Record of Decision, Implementation of Base Realignment and Closure (BRAC) 2005 Decisions for the Joint Strike Fighter (JSF) Initial Joint Training Site (IJTS), Eglin AFB, Florida," dated February 5, 2009, (*Federal Register*, Volume 74, page 34, February 23, 2009) (U.S. Air Force, 2009a) addressed the JSF IJTS and resulted in a decision to implement a portion of the JSF IJTS Alternative 1 presented in the *Proposed Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions at Eglin AFB, FL Final Environmental Impact Statement* (the FEIS) (U.S. Air Force, 2008a). That decision included the delivery of 59 F-35 Primary Aerospace Vehicle Authorized (PAA) (previously known as "Primary Assigned Aircraft" and referred to as "F-35 aircraft" or "JSF aircraft" throughout this document), associated cantonment construction, and limited flight training operations from Eglin Main Base. The Record of Decision (ROD) also determined that preparing a Supplemental Environmental Impact Statement (SEIS) would further the purposes of the National Environmental Policy Act (NEPA).

The primary purposes of this SEIS are as follows:

- To analyze the beddown location and operational alternatives and examine mitigations for the 59 F-35 PAA authorized for delivery by the February 2009 ROD (one squadron each for the Air Force, Navy, and Marine Corps), including the use of the Duke Field airfield and construction of a new runway(s) at Eglin Main Base
- To analyze additional alternatives addressing the proposed distribution of JSF flight operations, on and off the cantonment area, to allow efficient pilot training, de-conflict flying operations with other military and civilian operations, and reduce or avoid noise impacts on sensitive receptors

This supplemental document addresses where the F-35 aircraft may ultimately beddown on the Eglin Reservation, how they might be operated, and the degree to which other mitigation measures are possible. This SEIS contains analyses of operational alternatives and presents potential mitigations for the 59 aircraft authorized to be delivered to Eglin Air Force Base (AFB) under the February 2009 ROD. The Air Force has analyzed a range of alternatives that would, among other things, maximize the number of flight training operations to be conducted on the Eglin Reservation, preserve restricted airspace to the greatest extent possible, and protect the military value of Eglin AFB as a Major Range Test Facility Base (MRTFB) to support all existing and future military missions.

The February 2009 ROD indicated that this SEIS would analyze the proposed beddown and operational alternatives for 48 additional Air Force F-35 PAA not authorized under that ROD. Prior to the SEIS development, the Air Force began evaluating the regional airspace and in particular the capacity for future Department of Defense (DoD) missions within the region. That regional airspace study is known as the Gulf Regional Airspace Strategic Initiative (GRASI). Based on preliminary modeling data from the GRASI study in 2009, the mission airspace configuration would not support more than 59 F-35 aircraft. It is believed that GRASI recommendations will assist in implementing a comprehensive strategy for airspace planning and ensure that the military value of the MRTFB for all Eglin customers is maintained. Based on the GRASI projections, the Air Force decided to limit the number of aircraft evaluated in the SEIS to 59 F-35 aircraft (i.e., one squadron each for the Air Force, Navy, and Marine Corps).

After the Draft SEIS was published in September 2010, the Joint Program Office (JPO) released new noise profiles for the F-35 aircraft; consequently, the Air Force delayed the release of the Final SEIS. Meanwhile, the final GRASI recommendations became available, plus the Air Education and Training Command (AETC) revised the operational plans for the aircraft to reflect updated JSF training plans. The Air Force has revised the Draft SEIS to address the updated noise profiles, the GRASI recommendations, and the revised operational plans. Section 1.2.6 provides a more detailed explanation of the updates and differences between the 2013 Revised Draft/Final SEIS and the Draft SEIS that was published in September 2010.

This SEIS addresses multiple alternatives derived from Air Force review and public scoping, including a "no action" alternative. Section 2.3 of this document describes two Alternatives that examine the operations and support facilities necessary to implement a beddown of the 59 aircraft authorized under the February 2009 ROD. Each Alternative has various subalternative options. Chapter 3 of this document describes the affected environment for the proposed Alternative areas and defines the resource areas under consideration. For this SEIS, as described in Section 2.1, the existing conditions effectively are the consequences associated with the No Action Alternative; thus, those consequences are presented as the existing conditions in Chapter 3 for each affected resource. In some cases, an affected resource has existing conditions that are not the same for all alternatives. In those cases, the alternative-specific existing conditions are described within the resource analysis sections in Chapter 4. Chapter 4 documents the environmental consequences of each Alternative and compares the consequences to the No Action Alternative. Chapter 5 addresses cumulative impacts.

The analysis was conducted in accordance with NEPA requirements (42 United States Code [USC] 4321), the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Part 1500), and federal regulations for the Department of the Air Force Environmental Impact Analysis Process at 32 CFR 989, which addresses implementation of NEPA and directs officials to consider the environmental consequences of any proposal as part of the decision-making process.

After considering the potential environmental impacts of the required JSF activities, the Air Force will decide whether to implement an action Alternative or the No Action Alternative.

1.2 BACKGROUND

1.2.1 Summary of BRAC 2005 Relevant to this SEIS

In October 2008, Eglin AFB published the FEIS regarding the 2005 BRAC decisions for Eglin AFB. The decisions analyzed in the FEIS were: (1) Relocation of the Army 7th Special Forces Group (Airborne), or 7SFG(A), to Eglin AFB, Florida, from Fort Bragg, North Carolina; and (2) Standup of a JSF IJTS to train Air Force and Marine pilots and Naval aviators and maintenance personnel at Eglin AFB. Eglin AFB is required to accommodate JSF IJTS flight training requirements by providing airfields, access to regional airspace, ground support, and scheduling for training missions. This SEIS focuses on the beddown of the F-35 aircraft associated with the JSF IJTS as generally described in Section 1.1.

1.2.2 7SFG(A) Relocation to Eglin AFB Summary

The 2005 Base Closure and Realignment Commission (the "BRAC Commission") identified the need to relocate the 7SFG(A) to Eglin AFB from Fort Bragg, North Carolina (FEIS, Chapters 1 and 2).

On November 20, 2008, the Air Force signed a ROD for the implementation of the 2005 BRAC Report decision to realign the 7SFG(A) to Eglin AFB, Florida (*Federal Register,* Volume 73, page 235, December 5, 2008). The ROD states the decision to implement 7SFG(A) Cantonment Alternative 3 – West of Duke Field (Preferred Alternative) and 7SFG(A) Range Alternative 3 – East and West Side (Preferred Alternative). The decision was based on matters discussed in the FEIS, input from the public and regulatory agencies, and other relevant factors.

1.2.3 Joint Strike Fighter (F-35) IJTS Summary

Establishing the JSF IJTS requires construction of a cantonment area to accommodate JSF personnel and associated aircraft. Establishing the cantonment area will be accomplished through the Military Construction (MILCON) process by renovating existing facilities and constructing new facilities. Some building demolition will also be required. Construction began in calendar year (CY) 2009 for those facilities detailed in the FEIS (FEIS, Sections 2.5.2.1 and 2.5.2.2) and approved by the resulting February 2009 ROD. These facilities are also summarized under the No Action Alternative in Section 2.1.2. Additional facility needs not included in the FEIS or February 2009 ROD differ under each alternative analyzed in this SEIS and are described under each individual alternative in Section 2.3.

Initial and replenishment training of pilots and maintenance personnel (maintainers) will be conducted at the JSF Academic Training Facility (known as the "JSF Integrated Training Center" in the FEIS). Training in this facility will be accomplished by instructor-led classroom activities, independent study via interactive courseware workstations, training in simulators, and training on aircraft mock-ups. F-35 flight training will include instructor training, transition/conversion training, refresher and requalification training as well as initial pilot qualification training. Instructors will train a mix of fighter pilots and maintainers transitioning from existing legacy aircraft as well as graduates of each Service's undergraduate pilot and maintainer training programs. Pilots and maintainers will be trained with the requisite skills to meet the prescribed graduation criteria.

Instructors will train pilots and maintainers to operate and maintain the F-35 aircraft. The F-35 is a supersonic, single-seat, single-engine aircraft capable of performing and surviving warfare missions. There are three variants of the F-35:

- F-35A, Conventional Take-Off and Landing (CTOL) — Uses conventional Air Force aircraft launch and recovery techniques.
- F-35B, Short Take-Off Vertical Landing (STOVL) — Permits short takeoff, launch and vertical landing recovery, and slow landings from Navy amphibious assault aircraft carriers, Carrier Vehicle Nuclear, Landing Helicopter Amphibious (LHA), and Landing Helicopter Dock class ships (e.g., LHA 6 or Wasp) and United Kingdom (UK) Carrier Vehicle Future aircraft carriers.
- F-35C, Carrier Variant (CV) — Permits use on aircraft carriers by using larger, foldable wings to reduce landing-approach speed and space needed to store, operate, and maintain the F-35 CV while on the ship.

The IJTS was proposed to include three Air Force squadrons each with 24 aircraft per squadron (total of 72), one Marine Corps Fleet Replacement Squadron with 20 aircraft, and one Navy Fleet Replacement Squadron with 15 aircraft. These five squadrons would have included a total of 107 F-35 aircraft (72 CTOL, 20 STOVL, and 15 CV) for the JSF IJTS training mission at Eglin AFB. The FEIS (Figure 7-6, Chapter 7, JSF Flight Training, Affected Environment and Environmental Consequences) analyzed the impacts of the 107 aircraft and associated facilities and training at Eglin AFB. The total number of instructors proposed for the JSF IJTS requirement was anticipated to be 200, of which 134 were pilot instructors (both military and contractor) and 66 were maintainer instructors. The estimated maximum number of students attending the JSF IJTS at one time was approximately 545 (109 pilots and 436 maintainer students).

The FEIS evaluated two alternatives for the JSF IJTS cantonment and two flight training alternatives, in addition to a no action alternative. The two alternative locations for the JSF cantonment and the associated beddown of the JSF aircraft were sited at Eglin Main Base. The Air Force did not analyze alternatives that would have involved realigning or modifying auxiliary airfields or constructing new runways because such alternatives were deemed inconsistent with the guiding principles of the Secretary of Defense-established Education and Training Joint Cross-Service Group that developed DoD BRAC recommendations. Those guiding principles focused on using existing capacity, reducing costs, and achieving synergies. The two flight training alternatives evaluated in the FEIS forecast JSF training for 107 F-35 aircraft using Eglin Main Base as the primary base to begin and end daily training flights supplemented with two existing and active auxiliary fields for approach and landing practice. The two alternatives proposed a range of low and high numbers of operations at each airfield, best meeting anticipated training requirements.

The Preferred Alternative as proposed in the FEIS for the JSF cantonment area was the JSF IJTS Alternative 1. That alternative utilized the 33rd Fighter Wing (33 FW) area on Eglin AFB as one contiguous campus environment to accommodate the JSF IJTS facility requirements. That alternative consisted of constructing a combination of new buildings as well as renovating existing facilities/buildings located in the 33 FW area (FEIS, Figure 2-24). Initial facility requirements would have involved constructing approximately 23 new facilities or buildings, taxiways, and STOVL landing practice areas for a total construction of approximately 3,400,000 square feet (ft^2). Road construction would have added an additional 506,000 ft^2. In addition, JSF IJTS Alternative 1 would have included the renovation and demolition of nearly 600,000 ft^2 of existing facilities, plus nearly 1,500,000 ft^2 of renovation to the West Apron and more than 1,000,000 ft^2 of road and pavement renovation.

1.2.4 Record of Decision Signed for 59 F-35 Aircraft and Limitation of Operations

The February 2009 ROD resulted in a decision to implement a portion of the FEIS's JSF IJTS Alternative 1. The ROD authorized a total of 59 F-35 aircraft (one squadron each for the Air Force, Navy, and Marine Corps) for Eglin AFB and imposed limitations on operations to Runway (RW) 01/19 for JSF (F-35) aircraft. The ROD imposed runway limitations to avoid and minimize potential noise impacts on both the local community and Eglin AFB until the Air Force better understood the noise impacts and conducted an SEIS. Until the SEIS is completed, RW 12/30 will be the primary runway for JSF operations at Eglin Main Base.

The decision to implement a portion of the FEIS's JSF IJTS Alternative 1 was also identified as the environmentally preferred alternative. The Air Force determined that this limited decision, in conjunction with the associated mitigations measures, constituted all practicable means available at that time to both avoid and minimize environmental harm and comply with BRAC.

The ROD required the Air Force to amend the local Eglin AFB flying instruction (Air Armament Center Instruction [AACI] 11-201) to include JSF operations and the following guidance and limitations:

- RW 12/30: This is the primary runway at Eglin Main Base for F-35 operations.
- RW 19: Limited F-35 operations will be allowed from RW 19, which, other than takeoffs, includes only those flight operations necessary for emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements.
- RW 01: Limited F-35 operations will be allowed from RW 01, which, other than approaches and landings, includes only those flight operations necessary for emergencies, unplanned contingencies, and weather affecting aircraft performance limitations and requirements.

Note that Eglin AFB has converted "Air Armament Center Instructions" to "Eglin Air Force Base Instructions" (EAFBIs); therefore, AACI 11-201 is now known as EAFBI 11-201. EAFBI 11-201 was updated on January 25, 2010, and the identified JSF operations and limitations from the JSF ROD were included in the amended instruction.

1.2.5 BRAC SEIS

This SEIS analyzes alternatives for the operations of the ROD-authorized 59 F-35 aircraft without the flight limitations on RW 01/19 established in the ROD. This SEIS examines alternatives and presents possible mitigations at Eglin Main Base and at other locations on the Eglin Reservation. This SEIS also evaluates additional runways, cantonment sites, and other infrastructure associated with the alternatives that have been carried forward for analysis. The SEIS recognizes that multiple operational scenarios are possible. The final decision could be a selection of one of the alternatives in its entirety or could be a selection of various portions of any of the alternatives analyzed.

This SEIS does not re-analyze the construction and activities associated with the Academic Training Facility because the February 2009 ROD established that the facility would be located at Eglin Main Base, which was evaluated in the FEIS. This SEIS expressly considers new parallel runways or an additional runway alternative(s) within the Eglin Reservation, as suggested by several commenters during scoping and in comments on the published draft of the FEIS. The decision to implement part of the FEIS's JSF IJTS Alternative 1 does not in any way foreclose a reasonable beddown alternative from detailed analysis in this SEIS.

1.2.6 Updates Included in the Revised Draft/Final SEIS

As mentioned in Section 1.1, the JPO released updated noise profiles for all three of the F-35 variants after the Draft SEIS was published in September 2010; consequently, the Air Force delayed the release of the Final SEIS. During this delay, AETC revised the F-35 operational plans, and the GRASI was completed. As a result of the updated noise/flight profiles, revised operational plans, and GRASI recommendations, through the Revised Draft SEIS, the Air Force provided updated analyses to address several changes, as explained in more detail in this section.

Updated Noise Profiles

Several typical F-35 flight profiles were developed for use in environmental impact analysis (i.e., environmental impact statements) through repeated, carefully measured flight simulator runs. Flight profiles include data on aircraft altitude, engine power setting and air speed at several points along the flight track. Since 2010, the F-35 program has evolved, and more flight simulator operational data is available. As a result, representative flight profiles have been refined to represent more accurately the actual aircraft configurations that would be used to climb, descend, or remain in level flight while maneuvering in the airfield environment and while operating within military airspace. The SEIS reflects the most up-to-date set of flight profiles available for all three F-35 variants as provided by the JPO. Flight profiles used in noise modeling at Eglin AFB, Duke Field, and Choctaw Field were modified as required to account for local constraints and regulations.

The representative flight tracks used in modeling aircraft already based at an installation were also used to model the F-35, except where new flight tracks were developed for Choctaw Field to address certain operational constraints. It is important to note that aircraft can vary from typical flight paths for a number of reasons, to include following Air Traffic Control guidance, airfield traffic flow, weather conditions, safety, and so on.

Revised F-35 Operational Plans

Updated operational plans reflect the JPO's latest programmatic operational plans for the F-35. (These plans are provided in table format and are sometimes called "operational tables.") The estimates in these operational tables reflect the most current plan of JSF operations within the region. The tables' primary purpose is to support environmental analysis for this document by providing realistic JSF terminal and regional airspace utilization.

- **Updated F-35A Program Requirements:** Headquarters (HQ) Air Combat Command (ACC), in coordination with HQ Air Force, the JPO, and HQ AETC, worked on the F-35A program requirements. For the JSF Academic Training Facility at Eglin AFB, this includes inputs provided by the Navy and Marine Corps.
- **Revised Utilization Rate for F-35B and F-35C:** The F-35B and F-35C utilization rate has been updated to reflect the Navy's and Marine Corps' programmatic plan. Details about the specific changes are provided in Section 2.2.3.

  The programmatic plan produced and executed by the JPO is the result of this entire DoD interactive coordination. For illustration purposes, Table 1-1 provides a comparison of total F-35 operations between the September 2010 Draft SEIS and the 2013 SEIS.

Table 1-1. Comparison of Total F-35 Operations between the 2010 Draft SEIS and the 2013 SEIS

SEIS Alternative	2010 Draft SEIS*			2013 Revised Draft/Final SEIS**		
	Eglin	Duke	Choctaw	Eglin	Duke	Choctaw
No Action	55,605	34,347	20,104	43,071	18,650	20,263
1A	55,605	34,347	20,104	43,071	18,650	20,263
1I	55,605	34,347	20,104	43,071	18,650	20,263
2A	0	85,678	24,383	0	54,383	27,403
2B	24,547	85,509	0	14,962	66,725	0
2C	14,093	75,403	20,561	13,126	49,462	19,636
2D	24,033	58,222	27,839	13,912	47,296	21,312
2E	0	85,678	24,383	0	53,905	26,793

* The 2010 Draft SEIS also included 2,181 operations at Naval Air Station (NAS) Pensacola and 1,757 operations at Tyndall AFB. The operations for Eglin AFB also included international partner training operations.

** The 2013 Revised Draft/Final SEIS includes 1,947 operations at NAS Pensacola and 6,862 operations at Tyndall AFB. The above operations for Eglin AFB also take into account and include international partner training operations.

- **Reduction in Night Operations:** HQ AETC provided updated estimates of terminal area night operations, resulting in a reduction in night landings past 10:00 PM from the 5 percent previously estimated in the Draft SEIS to 3 percent, analyzed in the Revised Draft/Final SEIS.
- **Academic Training Facility Student Production:** The calculation of training requirements for formal training units is an important dynamic for F-35 programmatic planning. However, student production does not dominate program planning. It is only one parameter among many that make up decisions that drive the total JPO plan. Student production requirements are defined by many interactive factors, including but not limited to the following:
  - Total force structure recapitalization requirements and defense posture analysis
  - Aircraft production rates (how quickly the aircraft are being produced)
  - Number of training coded aircraft
  - Flying hours and sortie generation capabilities
  - Pilot force experience levels, aircrew ratios, and pilot replenishment rates
  - Difficulty of the mission
  - Length of the syllabus (what qualifications and degree of skill, as directed by HQ ACC)
  - Fiscal constraints (what is affordable)

Due to changes in production rates and other programmatic factors, the ground rules and assumptions underlying the calculation of student production were reassessed. Based upon previous assumptions in the operational tables provided for the Draft SEIS, the Air Force estimate was approximately 22 Full Course Equivalents per year for its 24-PAA squadron. This calculation has not changed for the updated operational tables being discussed.

Although the planning factors are subject to change as the F-35 weapons system matures, the total operations tempo is not expected to surpass the level of activity estimated in the updated operational tables provided. The new estimates (Table 1-1) align very closely to legacy fighter training operations tempos, all of which are the result of years of time-tested maturation.

GRASI Recommendations

The GRASI report developed recommendations to accommodate the airspace needs of a growing military mission and progressively increasing civilian aviation activities. GRASI stakeholders, aided by experts from universities across the southeastern United States, developed a variety of possible strategies to enhance the use of airspace in the Gulf region with the goal of ensuring a near-optimum use of airspace by civilian and military stakeholders (U.S. Air Force, 2011a).

Not all of the recommendations provided in the GRASI report are mature for analysis. The following GRASI recommendations that are directly or indirectly related to the Proposed Action and/or mitigations have resulted in changes or additions to the SEIS:

- **Utilization of additional special use airspace (SUA):** Additional non-Eglin-controlled airspace was incorporated to expand training opportunities. Additional SUA units evaluated include Camden Ridge/Pine Hill, Carabelle East/West, Compass Lake, Desoto/Restricted Area R-4401, Warning Area W-155, and Moody. Table 1-2 lists the existing regional airspace that was analyzed in the FEIS, the Draft SEIS, and/or the Revised Draft/Final SEIS.
- **Relocation of some simulated flameout operations:** Simulated flameout approaches have been shifted from Eglin Main Base and Duke Field to Choctaw Field and Tyndall AFB to improve airspace in the North/South corridor.
- **Creation of four new Air Traffic Control assigned airspaces (ATCAAs):** Four new ATCAAs are currently being established. The ATCAAs are anticipated to be at altitudes greater than 24,000 feet AGL. The creation of the four ATCAAs will occur under a memorandum of understanding and will not require formal FAA rulemaking.
- **Efficient use of airspace over R-2914 and R-2915:** This recommendation involves utilizing a new scheduling tool that would track and compare scheduled airspace with airspace actually utilized in order to increase efficiency and allow for more flexibility.

- **Establishment of programs to educate the general aviation community, including intensive pilot training:** This is an ongoing administrative action that does not require environmental analysis under NEPA.
- **Creation of procedures or systems to enhance coordination and visibility of scheduling:** This is an ongoing administrative action that does not require environmental analysis under NEPA.
- **GRASI Executive Steering Committee meetings:** The GRASI Executive Steering Committee currently meets on a six-month cycle and will continue to meet to monitor implementation and provide guidance.

Table 1-2. Airspace Unit Comparison among the FEIS, Draft SEIS, and Revised Draft/Final SEIS

Airspace Type	Name	Floor	Ceiling	Analyzed in the		
				FEIS	Draft SEIS	Revised Draft/Final SEIS
Restricted Areas	R-2914A	Surface	Unlimited	✓	✓	✓
	R-2914B	8,500 ft MSL	Unlimited	✓	✓	✓
	R-2915A	Surface	Unlimited	✓	✓	✓
	R-2915B	Surface	Unlimited	✓	✓	✓
	R-2915C	8,500 ft MSL	Unlimited	✓	✓	✓
	R-2919A	Surface	Unlimited	✓	✓	✓
	R-2919B	8,500 ft MSL	Unlimited	✓	✓	✓
	R-4401 A	Surface	4,000 ft MSL			✓
	R-4401 B	4,000 ft MSL	18,000 ft MSL			✓
Military Operating Area	Eglin MOA-A	1,000 ft AGL	18,000 ft MSL	✓	✓	✓
	Eglin MOA-C	1,000 ft AGL	18,000 ft MSL	✓	✓	✓
	Rose Hill MOA	8,000 ft MSL	18,000 ft MSL			✓
	Tyndall MOA C/D	300 ft AGL	6,000 ft MSL	✓	✓	✓
	Tyndall MOA E/F	300 ft AGL	18,000 ft MSL	✓	✓	✓
	Camden Ridge	500 ft AGL	10,000 ft MSL			✓
	Pine Hill	10,000 ft MSL	18,000 ft MSL			✓
	Moody 3	8,000 ft MSL	18,000 ft MSL			✓
	Desoto I	500 ft AGL	10,000 ft MSL			✓
	Desoto II	100 ft AGL	5,000 ft MSL			✓
Warning Areas	W151A	Surface	Unlimited	✓	✓	✓
	W151B	Surface	Unlimited	✓	✓	✓
	W151C	Surface	Unlimited	✓	✓	✓
	W151D	Surface	Unlimited	✓	✓	✓
	W151E	Surface	Unlimited	✓	✓	✓
	W151F	Surface	Unlimited	✓	✓	✓
	W155A	Surface	Unlimited			✓
	W155B	Surface	Unlimited			✓
	W470A	Surface	Unlimited			✓
	W470B	Surface	Unlimited			✓
	W470C	Surface	Unlimited			✓
Military Training Routes	VR-1082	Surface	1,500 ft AGL	✓	✓	✓
	VR-1085	Surface	1,500 ft AGL	✓	✓	✓
	VR-1017	Surface	1,500 ft AGL		✓	✓
	VR-1056	Surface	1,500 ft AGL		✓	✓
	IR-17	Surface	1,500 ft AGL			✓
	IR-31	Surface	1,500 ft AGL			✓

AGL = above ground level; BRAC = Base Realignment and Closure; FEIS = *Proposed Implementation of the BRAC 2005 Decisions and Related Actions at Eglin AFB, FL Final Environmental Impact Statement*; ft = feet; IR = instrument route; MOA = military operating area; MSL = mean sea level; SEIS = Supplemental Environmental Impact Statement; VR= visual route

Other recommendations provided by the GRASI report that are not mature for analysis at this time and are presented in this SEIS only as long-term management considerations not specific to the F-35 aircraft include:

- **Establishment of standard instrument departures (SIDs) and standard terminal arrival routes (STARs):** This involves establishing, through coordination with other locations, route entry points for east-west aircraft traffic over shoreline airspace for ascent and descent in order to increase efficiency.
- **Locating remote emitters outside of restricted areas:** At this time no decision has been made and no locations have been identified for potentially locating remote emitters outside of restricted airspace.
- **Expanding operating hours to six days per week:** A study is currently being conducted on the feasibility of operating six days a week; however, a decision has not yet been made.
- **Establishing new partnerships for landscape-scale training:** Landscape-scale training involves utilizing non-military airspace and compatible private, local, state, and federal lands for nonhazardous missions. A year-long study to identify requirements and opportunities for increased mission capability and flexibility was started in April 2012.
- **Evaluating North Pensacola Military Operating Area (MOA) reorganization:** Reorganizing the North Pensacola MOA is currently being evaluated by the Navy for feasibility.
- **Creating a new munitions impact area:** At this time no areas have been identified for a potential new munitions impact area. Separate NEPA analysis, if required, would be conducted upon the decision to create a new munitions impact area.
- **Creating a regional control facility:** There are no plans at this time to implement this recommendation. Separate NEPA analysis, if required, would be conducted upon the decision to construct a regional control facility.

In addition to the updates discussed in this section, since four years has elapsed since the FEIS, the Air Force has also updated the baseline data in the SEIS's No Action Alternative to reflect the most current information.

1.3 PURPOSE OF AND NEED FOR ACTION

The overarching purpose and need for the F-35 portion of the proposed action in the FEIS was to implement the BRAC 2005 program, as required by law, and establish the JSF IJTS at Eglin AFB. The February 2009 ROD authorized implementation of a portion of the FEIS's JSF IJTS Alternative 1 to meet the essential BRAC requirements to establish the academic training, the flying training, and logistical portions of the JSF IJTS at Eglin AFB. The ROD authorized delivery and limited operations of 59 F-35 PAA, as well as implementation of the BRAC and the Services' MILCON related to installation support, operations and maintenance, and academic training requirements.

The primary purposes of this SEIS are as follows:

- To analyze the beddown location and operational alternatives and examine mitigations for the 59 F-35 PAA authorized for delivery by the February 2009 ROD (one squadron each for the Air Force, Navy, and Marine Corps), including the use of the Duke Field airfield and construction of a new runway(s) at Eglin Main Base
- To analyze additional alternatives addressing the proposed distribution of JSF flight operations, on and off the cantonment area, to allow efficient pilot training, de-conflict flying operations with other military and civilian operations, and reduce or avoid noise impacts on sensitive receptors

The DoD has selected the F-35 to be the next-generation multi-role fighter aircraft for the Air Force, Navy, and Marine Corps. Total production of the JSF is expected to exceed 2,500 aircraft. The 2005 BRAC Program decisions directed the establishment of an IJTS at Eglin AFB to conduct both maintenance and pilot training for the new F-35 multi-role aircraft. The F-35 is a cooperative development program, and the IJTS is intended to train Air Force, Navy, and Marine Corps students for the United States, as well as students from eight other international participant countries (UK, Italy, Netherlands, Turkey, Canada, Australia, Denmark, and Norway) and others who may join as participants. International partner training is included in all operational plans associated with each Alternative (see the Revised F-35 Operational Plans discussion under Section 1.2.6).

As described in Section 1.1, the goal is to identify a beddown location for the 59 F-35 aircraft at Eglin AFB. The Air Force has analyzed a range of alternatives that would, among other things, maximize the number of flight training operations able to be conducted on the Eglin Reservation, preserve restricted airspace to the greatest extent possible, protect the military value of Eglin AFB as an MRTFB to support all existing and future military missions, and avoid or minimize noise impacts.

1.4 ENVIRONMENTAL IMPACT ANALYSIS PROCESS

1.4.1 Requirements

This SEIS has been prepared in accordance with NEPA (42 USC 4321) and CEQ regulations (40 CFR 1500), including 40 CFR 1502.9, which presents specific guidance regarding supplemental environmental documents.

As directed by 40 CFR 1502.9, a supplement is prepared when there are substantial changes made to a proposed action relevant to environmental concerns or significant new concerns or information relevant to environmental concerns or bearing on the proposed action or its impacts, or when the purposes of NEPA will be furthered by completion of a supplement (as in the case of this SEIS).

The SEIS focuses on issues specific to the Proposed Action and will not address impacts that have not changed from the FEIS. For example, sonic booms would only occur over water in warning areas as described in the FEIS and are not addressed again in this SEIS.

1.4.2 Summary of Public Scoping Process

NEPA and the Air Force's implementing regulations require the lead agency (in this case, the Air Force) to seek public participation throughout the environmental impact analysis process. "Scoping" identifies potential issues and alternatives early in an environmental impact statement (EIS) development process. Although a scoping process is not required for an SEIS, the Air Force elected to involve the community. A Notice of Intent to prepare an SEIS was released on July 31, 2009, with associated newspaper, radio, and television announcements. A Notice of Intent was published in the *Federal Register* on August 6, 2009. After public notification, four public scoping meetings were held in 2009 in the following Florida communities: Crestview (August 24), Navarre (August 25), Niceville (August 26), and Valparaiso (August 27).

1.4.3 Summary of Concerns Raised in the Public Scoping Process and Public Comment Period

A total of 69 members of the public and government agencies submitted comments to the Air Force during the scoping meetings and comment period. The majority of public comments received during the public scoping process were directed at concerns regarding aircraft noise and its impact on the public, human health, and residential property values. Many comments were also received regarding the Proposed Action and range of alternatives.

Many commenters suggested various types of beddown options, most of which are either included in the proposed alternatives or were eliminated due to operational issues as addressed in Section 2.3 of this SEIS. For example, one commenter suggested parallel runways at Duke Field or Choctaw Field with a corresponding LHA, whereas another commenter indicated that a split beddown should be considered. Alternatives carried forward contain split operations with at least one auxiliary field. One Main Operating Base (MOB) alternative at Duke Field contains a parallel runway with an LHA, and Choctaw Field was evaluated for parallel runways but was eliminated due to operational reasons. Details regarding Choctaw Field's elimination are in Section 2.3.

Commenters suggested a new runway in the middle of the range while another suggested an east-west runway at Duke Field. Both situations would have impacted operational feasibility, capacity, and range sustainment as outlined in Section 2.3.

There were several positive comments associated with the economic benefit that the aircraft beddown would have on the local communities surrounding the Eglin AFB military reservation. Other commenters expressed concerns about limitations in airspace and time potentially causing mission conflicts between the established schedules for 96th Test Wing (i.e., the former 46th Test Wing) and the proposed 7SFG(A) and F-35 training schedules. Another commenter was concerned that due to the aforementioned mission conflicts, the Test Wing would leave Eglin, which could have negative economic effects on communities surrounding Eglin. There were further concerns regarding potential air and ground congestion due to the F-35s sharing runways with commercial airlines at Northwest Florida Regional Airport. These comments are further addressed in Chapter 4, Section 4.5.1.1. Appendix A, *Public Involvement*, provides additional information on the public scoping process and comments received during the public comment period.

1.4.4 Summary of Comments Provided During the Draft SEIS Review and Comment Period

A Notice of Availability for the Draft SEIS was published in the *Federal Register* on September 24, 2010, with associated newspaper, radio, and television announcements. After public notification, three public hearings were held in October 2010 in the following Florida communities: Valparaiso (October 12), Niceville (October 13), and Crestview (October 14). A total of 76 members of the public and government agencies submitted approximately 400 comments to the Air Force during the public hearings and Draft SEIS comment period. The majority of public comments received during the Draft SEIS public review process expressed concerns regarding: the Preferred Alternative, impacts to residential property value and mitigation costs, encroachment, public health issues unrelated to aircraft noise, implementation of adaptive management, and aircraft noise and its impact on the public and human health.

Normally the Air Force responds to relevant substantive comments on a draft EIS or SEIS in the final EIS or SEIS, consistent with 40 CFR 1503.4; however, since a substantial number of comments were submitted on the 2010 Draft SEIS and public comments were solicited on the Revised Draft SEIS, the Air Force elected to summarize the substantive comments received on the 2010 Draft SEIS and provide Air Force responses in this section. Appendix A, Volume II, provides copies of government agency comments on the 2010 Draft SEIS. The Air Force responses to those substantive agency comments on the 2010 Draft SEIS are contained in this section of the Final SEIS. Agency and public comments received on the 2013 Revised Draft SEIS and the Air Force's responses to those comments are presented in the 2013 Final SEIS, Appendix A, Volume III.

Generally, substantive comments are regarded as those comments that challenge the analysis, methodologies, or information in the Draft SEIS as being factually inaccurate or analytically inadequate; that identify impacts not analyzed or develop and evaluate reasonable alternatives or feasible mitigations not considered by the agency; or that offer specific information that may have a bearing on the decision, such as differences in interpretations of significance, scientific, or technical conclusions. Non-substantive comments, which do not require an agency response, are generally considered those comments that express a conclusion, an opinion, or a vote for or against the proposal itself, or some aspect of it; that state a position for or against a particular alternative; or that otherwise state a personal preference or opinion.

The substantive comments on the 2010 Draft SEIS are paraphrased below from the comment letters and public hearings and are organized by the following general themes and subordinate issues:

- Noise
  - Noise Modeling
  - Flight Profiles
  - Noise Source Data
  - Number of Operations
  - Flight Tracks and Profiles
  - Noise metrics (i.e., day-night average sound level [DNL])
  - On-base noise impacts
- Adaptive Management, Mitigation, and Monitoring
- Children/Minorities
- Costs
- Domestic Animals
- Encroachment
- Flying Days and Late Night Operations
- GRASI
- Maps
- Military Training Route (MTR) Operations
- Supersonic Flight Information

1.4.4.1 *Noise*

Noise-related **c**omments raised questions about the validity of noise modeling data (flight profiles, noise source data, number of operations, etc.), of noise metrics presented in the SEIS (particularly the DNL metric), of flight tracks used in the modeling, or of NOISEMAP as an accurate and useful model. Some comments requested additional noise metrics and/or more specific information about noise impacts based on the time of day. Other noise-related comments focused on impacts to critical missions at Eglin AFB, such as the McKinley Climatic Lab, etc., or occupational safety and health impacts to non-flightline workers while outdoors.

Air Force Responses:

Noise Modeling

Air Force Handbook 32-7084 states that in 1973, the Air Force adopted the NOISEMAP computer program to describe noise impacts created by aircraft operations. NOISEMAP results have been field tested against actual long-term noise level measurements and found to be valid (Armstrong Laboratories, 1991).

Flight Profiles

Every effort was made to develop the most accurate predictions of flight operations, including flight track locations, airspeed, power, and altitude settings, and the number of operations. To demonstrate this, the profiles utilized in the FEIS, originally created in 2006, were reviewed and updated for the 2010 Draft SEIS and the 2013 Revised Draft/Final SEIS. Please see Section 1.2.6. Data utilized for noise analysis in the 2010 Draft SEIS were drawn from a data set known as “Karnes 2.0,” and “Karnes 3.1” data were used for the Revised Draft/Final SEIS noise analysis.

Noise Source Data

The Air Force Research Laboratory conducted actual measurements of F-35A noise at Edwards AFB in October 2008. This information was incorporated into the NOISEFILE database and is used in this analysis. At this time, actual noise measurement data are not available for the F-35B or F-35C. As a result, the Air Force used the F-35A source data for all three F-35 variants in the NOISEFILE database, and used generally accepted theoretical approaches toward applying that data to one of the other variants where reasonably required.

For example, using the F-35A noise source data, the Air Force adjusted the speeds, powers, and altitudes as described below for STOVL operations. Specifically, an F-35B STOVL landing was modeled short of the landing pad at 95 percent power and 5 knots, while a regular F-35A CTOL landing was modeled at 50 percent power and 170 knots.

STOVL operations for the F-35B were modeled using the DoD-approved and DoD-directed noise analysis computer model NOISEMAP. Because NOISEMAP is not capable of analyzing varying degrees of nozzle directivity (specifically directing the nozzles down during vertical ascent or descent), the F-35B STOVL operations were approximated by using the F-35A noise source data and then adjusting its speed, power, altitude, and time to reflect that used during F-35B STOVL operations.

Number of Operations

Comments were made on the validity of the operational data used in the 2010 Draft SEIS. The 2010 Draft SEIS applied updated operational data that reflected the JPO's latest programmatic operational plans for the F-35 aircraft at that time.

JSF flight training requirements are considered initial requirements due to various factors, primarily the relative immaturity of the F-35 aircraft. Analysis of JSF IJTS Alternative 1 of the FEIS was based on the airfield flight operations associated with 107 F-35 aircraft. Since the JSF program is constantly evolving, the training plans have been updated and proposed flight operations have decreased since the February 2009 ROD. The initial operations plans developed by the JPO in late 2006 and early 2007 were an estimate built from early Instructional System Development by Lockheed Martin, data gathered from other training bases, and personal experiences of members of the JPO. The total number of flight operations was based on an early syllabus and basic assumptions on the number of operations a pilot would execute. In addition, limited aircraft performance data were available.

The initially desired level of Air Force pilot training was not constrained by aircraft availability. The initial planning factor was to train 40 Initial Course Equivalent students per year. The training plans have matured as the intended mission of the aircraft has become better understood, and the expected flight durations to complete the desired training have been revised. The FEIS data used in its JSF IJTS Alternative 1 for 107 aircraft were based on flying the maximum level necessary to train 40 students per Air Force squadron. This inflated the aircraft flight rates to be higher than historically achieved. Since the FEIS was published, HQ AETC has estimated that Air Force F-35 aircraft will fly 25 hours per month and constrained the number of students to be trained by that planning factor.

The Marine Corps flight operation tables were initially planned for each student to perform an average of 5.3 landings per sortie. After further analysis on fuel capacity and time available, a new planning factor of 250 landings per student for the entire training was used. Most missions during the tactical phases of the training will be conducted with limited fuel available (which constrains the time available) to perform multiple practice landings. This new planning factor reduces the Marine Corps total airfield operations by 30.7 percent from that considered in the FEIS.

The Navy had a similar issue. More landings per sortie were initially planned than can be executed during the available time. New guidance from Navy HQ was to build a training plan that allowed each student to achieve at least 100 landings before beginning the Field Carrier Landing Practice (FCLP) phase. This allows the average number of landings for the core training to go from 4.5 planned per sortie to approximately 2 per sortie. The FCLP phase has remained the same, with 10 landings per flight. All together, the Navy airfield operations total was reduced by 27.3 percent from what was considered in the FEIS.

With the reduction in number of F-35 PAA coupled with the change in training plans, the overall number of airfield flight operations projected for the F-35 aircraft stationed at Eglin AFB (approximately 114,000 annually in the 2010 Draft SEIS) was reduced by over 52 percent in comparison to the flight operations represented in the FEIS (approximately 240,000 annually).

Flight Tracks and Profiles

The representative flight tracks used in modeling aircraft operations already based at an installation were also used to model the F-35, except where new flight tracks were developed for Choctaw Field to address certain operational constraints. It is important to note that aircraft can vary from representative flight paths for a number of reasons, to include following Air Traffic Control guidance, airfield traffic flow, weather conditions, safety, and so on.

Comments received during the SEIS process indicated, in effect, that unless pilots were directed to fly the updated flight profiles at the exact throttle settings used in the noise modeling in this SEIS, the noise profile maps will be invalid predictors of community noise impacts. The Air Force unequivocally disagrees with this assertion and offers the following additional information about flight profile generation and noise modeling.

The F-35 flight profiles were developed to represent as closely as possible, how pilots are predicted to fly more than 28 different types of flight operations in each variant of the F-35. These flight profiles are general in nature and are subject to modification or adjustment for site-specific conditions, as applicable. As such, they are reasonable indicators of how any given pilot could fly a particular operation either generally at a typical airfield or at a particular air base or range under site-specific conditions. However, these flight profiles and engine throttle settings cannot be used to prescribe exactly, as some comments have suggested, the way pilots fly particular operations. Throttle settings are a function of many factors, some of which include desired airspeed; gross weight; wind and weather; engine performance; and pilot technique and proficiency. All of these factors mean that there is no one throttle setting that will work for every jet and every pilot in the same situation. However, all F-35 pilots will be required to adhere to technical orders and other flight instructions, such as local course rules, altitudes, airspeeds, etc., and the expected throttle settings are derived from those requirements, not vice versa. Because of the general requirement to adhere to local flight procedures, any differences among pilots and jets performing the same operation will be very small, except for those differences that may be required to maintain a safe flight condition in an individual circumstance.

Noise metrics (i.e., DNL)

DNL (i.e., the average sound level over a period of a day and night) is the federally accepted standard for analyzing noise impacts around airfields. DNL is the U.S. Environmental Protection Agency (USEPA)-approved metric used by the DoD and is reaffirmed by the Federal Interagency Committee on Noise (FICON) (1992) as the metric best suited to address airfield noise impacts. DNL accounts for the loudness and duration of individual aircraft events and the number of operations. DNL also includes a 10-decibel (dB) penalty for aircraft noise events occurring between 10:00 PM and 7:00 AM. DNL can be used as an indicator of annoyance, which includes speech interference and activity interruption. However, DNL is not the sole metric utilized in this SEIS. Additional metrics used to describe noise exposure include sound exposure level (SEL), potential hearing loss (PHL), number of events above 50 dB, and hourly "equivalent sound level" (L_{eq}) during school day events, for each alternative. Each metric is explained in detail in Appendix E of the SEIS.

On-base Noise

Under DoD Instructions, Occupational Safety and Health Administration (OSHA) standards apply to the extent possible, practicable, and consistent with military requirements. Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) standards apply unless specifically exempted by variance or determined to be an acceptable deviation.

The bioengineering staff is evaluating actual JSF noise impacts to on-base areas and implementing policies and procedures in accordance with Air Force Instruction 91-301, *AFOSH Standards*, in particular AFOSH Standard 48-20, *Occupational Noise and Hearing Conservation Program*.

1.4.4.2 *Adaptive Management, Mitigation, and Monitoring*

Comments suggested specific mitigation or monitoring measures, including automated continuous monitoring, and requested clarification on the adaptive management process and the timing and method of implementing this process. Some suggested mitigations included redesigning the aircraft; prohibiting the use of RW 01/19, Test Area (TA) C-52, or live munitions; and using additional auxiliary fields.

Air Force Response:

Regarding noise mitigation generally, each of the alternatives analyzed in the SEIS, in varying degrees, has built-in operational noise mitigations, such as limiting RW 01/19 operations to no or minimal operations and other operational restrictions and shifting training operations to runways that are less noise-sensitive (including airfields not previously analyzed). See Section 4.3.4 for a description of some of these measures.

Regarding adaptive management, mitigation, and monitoring, the Air Force environmental impact analysis process regulations require the action proponent to prepare a mitigation plan and forward it to Headquarters (HQ), U.S. Air Force for review within 90 days of the signing of the ROD. Among other things, the mitigation plan must specifically identify each mitigation measure, how the measures will be executed, and who will fund and implement the mitigations. Requiring the detailed mitigation plan after the signing of the ROD enables the mitigation plan to be tailored precisely to the decision that is made. In the analysis of anticipated impacts in the SEIS, the Air Force has done its best to accurately predict potential impacts and anticipate future conditions using the best available information and tools at the time of analysis. However, given the nature of the alternatives analyzed; the dynamics surrounding Eglin AFB; the maturity of the F-35 aircraft and its training program; and the likelihood that baseline conditions will have unanticipated changes, new information may become available, or the effectiveness of mitigation measures may be different than expected. Adaptive management techniques are well suited to such circumstances, but are not a replacement for potential future NEPA analyses, when required.

Since the adaptive management approach is being adopted as part of the implementation for the beddown and operations of the JSF IJTS at Eglin AFB, any post-ROD mitigation plan for its beddown and operations will need to include provisions for monitoring aircraft operations post-implementation and the success of the mitigations, as well as procedures for making necessary adaptations.

Some adaptations, such as those that would result in a substantial change to the action, may require additional NEPA analysis. Thus, the post-ROD mitigation plan will include an adaptive management program, which could incorporate (for example) the following kinds of adaptive management approaches:

- Noise modeling: Supplement existing data with new noise data as it is developed. Use new data to reveal and understand the potential effects of activities or practices that are under way or being considered for implementation in the F-35 IJTS ramp up to final operational capability and thereafter. Make changes to improve mitigations and related actions.
- Management and oversight: Monitor and evaluate results of earlier predictions. Develop and implement adaptations to eliminate or reduce effects.

- New knowledge and information: Through experimentation, knowledge and information can be incorporated into management options and recommendations.

The following additional steps will also be part of the mitigation plan:

- Identifying the type of monitoring for the action and each mitigation
- Delineating how the monitoring will be executed
- Identifying who will fund and oversee its implementation
- Establishing the process and responsibilities for identifying and making changes to the action or mitigations to influence beneficial results or avoid/reduce adverse ones

1.4.4.3 *Children/Minorities*

Comments requested information about the numbers of children and/or minorities who might be impacted.

Air Force Response:

In the Revised Draft/Final SEIS, the Air Force added information from the 2010 Census on the number of children and minority and low-income populations impacted under each of the alternatives. Please see Sections 3.5 and 4.5.

Potential noise exposure to additional children as a result of projected population growth has been added to the Socioeconomics cumulative effects section in Chapter 5, Cumulative Impacts.

1.4.4.4 *Costs*

A comment suggests that the implementation costs included in the 2010 Draft SEIS were slanted toward Alternative 1A or otherwise left out valid costs such as those for sound attenuation/mitigation.

Air Force Response:

Although the Air Force included rough order-of-magnitude military construction costs in the 2010 Draft SEIS's Appendix L, NEPA generally does not require that implementation costs for alternatives be included in NEPA documents. Therefore the Air Force removed all cost data from the SEIS. The final alternative selection decision will be based on environmental, technical, economic, and other factors, including the Air Force mission. Per 40 CFR 1502.23 "For purposes of complying with [NEPA], the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations."

Additionally, while Congress has given the Federal Aviation Administration (FAA) authority to spend taxpayer money for mitigating noise at private residences and noise-sensitive receptors in relation to airport construction or expansion, it has not given the military Services any similar general authority.

1.4.4.5 *Domestic Animals*

A commenter cited Section C.3.8 of the *Draft U.S. Marine Corps F-35B West Coast Basing EIS* (the *Marine Corps' West Coast F-35B EIS*) as support for the commenter's assertion that the Air Force incorrectly concluded in the Draft SEIS that there would be no significant noise impact on domestic animals.

Air Force Response:

The Air Force added information to this SEIS in Section 3.13.5 based on Section C.3.8, Effects on Domestic Animals and Wildlife, in the *Final Marine Corps' West Coast F-35B EIS* (U.S. Marine Corps, 2010). However, that information does not change the conclusion that domestic animals will not be significantly impacted by aircraft noise. The *Marine Corps' West Coast F-35B EIS* states that "many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals…" That EIS goes on to generally state that "[a]lthough some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time."

1.4.4.6 *Encroachment*

Commenters expressed their perception that the change in missions at Eglin AFB is encroaching on their communities.

Air Force Response:

The Air Force recognizes that military-related noise can be an encroachment on the community, and the environmental impacts analysis required by NEPA reflect these impacts in the land use and noise sections in the SEIS.

In 1973, the Air Force began implementing the Air Installation Compatible Use Zones (AICUZ) program, which utilizes noise contours developed from computer modeling and locations of past aircraft accidents. Through the AICUZ program, the installation works with local planning agencies to provide them with information on operations that can be considered in local planning and zoning documents.

Communities are discouraged from using the noise contours as actual boundaries for local planning and zoning because contours often decrease or expand due to mission needs, as is the case with the F-35 beddown. Since Eglin AFB's first AICUZ report was released in 1976, changes to missions through 2006 caused the noise contours to contract.

1.4.4.7 *Flying Days and Late Night Operations*

Comments suggested clarifying the number of "flying days" and whether all Services would observe the same no-fly days and considering limits on nighttime flight training to minimize sleep interference.

Air Force Response:

The SEIS was revised to clarify that the F-35 aircraft would fly approximately 232 days in a year, which may not necessarily occur on the same days for each Service.

Specifics regarding the exact days and hours of flight cannot be defined at this time, as discussed in Chapter 2 of this SEIS. However, the noise analysis and consequences have been evaluated based on the operations and not the number of aircraft as discussed in Section 2.2 of this SEIS.

Please refer to Table 3-3, Table 4-1, Table 4-7, Table 4-12, Table 4-17, Table 4-23, Table 4-29, and Table 4-35 for the percentage of operations that would occur from 10:00 PM to 7:00 AM. Additionally, Appendix E contains further information regarding the 10-dB penalty applied to nighttime operations.

1.4.4.8 *Gulf Regional Airspace Strategic Initiative (GRASI)*

Comments suggested that the Final SEIS should discuss whether implemented GRASI recommendations create the potential to increase airspace capacity for the F-35 and address associated potential noise impacts to surrounding communities, including children and minority and low-income populations.

Air Force Response:

The GRASI recommendations that are specific to implementing the JSF's proposed action have been incorporated into this SEIS (see Section 1.2.6 for details). If needed, separate NEPA analysis would be conducted if additional GRASI recommendations are implemented.

1.4.4.9 *Maps*

Commenters noted that the maps and/or the descriptions of the maps were unclear.

Air Force Response:

In response to public comments, this SEIS contains updated maps and descriptions.

Figure 3-4 shows the No Action Alternative and the 2006 AICUZ contours. Further, Figure 3-6 and the associated Table 3-5 show various noise-sensitive receptors in the area. Similar maps and tables are provided under each of the Alternatives. You may be able to associate your home with one of these receptors that you know to be located near your home. Additionally, Eglin AFB has provided the noise contour data to the City of Valparaiso and Okaloosa County, which can be used to zoom in on various points of the maps.

Figure 4-4, Figure 4-8, and similar figures associated with the other Alternatives show Alternative-specific noise contours overlaying a satellite map of the affected area. DNL contours along with color-shaded gradient beneath the noise contours associated with the respective Alternative is provided in those figures to convey that noise does not stop at the contour lines. Figure 4-5, Figure 4-9, and similar figures associated with the other Alternatives show the Alternative-specific DNL contour lines in black, overlaying No Action Alternative color-shaded DNL noise contours.

1.4.4.10 *Military Training Route Operations*

Comments requested additional details regarding the operational details (altitude/frequency) of flights within military training routes (MTRs).

Air Force Response:

Flight paths within MTRs have broad widths, which can vary in size. A point on the ground beneath an MTR may not be overflown during any given operation. However, it is assumed that, over time, all points on the ground will be overflown and noise effects were modeled accordingly. On MTRs aircraft are modeled as being more likely to fly near the route centerline, with the likelihood of overflight tapering off towards the edges of the route. To estimate noise impacts conservatively, the route centerline noise level is reported for the entire route corridor.

The *Marine Corps' West Coast F-35B EIS* states "The F-35B would conduct training at higher altitudes than the legacy aircraft, operating above 5,000 feet AGL more than 99 percent of the time," which references airspace training activity. At Eglin, noise impacts in military training airspace were presented in the FEIS in Section 7.3 and were based on reasonable assumptions at that time.

Based on updated fidelity of expected flight parameters presented in the Revised Draft/Final SEIS, 85 percent of all F-35 operations were modeled in restricted areas above 10,000 feet AGL, and 92 percent of operations in MOAs were modeled above 10,000 feet AGL. Flight operations utilizing MTRs were all modeled no lower than

500 feet AGL and at least 30 percent of all MTR operations were modeled higher than 750 feet AGL.

1.4.4.11 *Public Comment Synopsis*

One comment requested that the Air Force provide a synopsis of public comments and the Air Force's responses.

Air Force Response:

In accordance with NEPA, a synopsis of substantive public and agency comments on the 2010 Draft SEIS and the Air Force responses are included in this section. All of the public and agency comments received on the Revised Draft SEIS, and the Air Force's responses, are presented in Appendix A, Volume III, of the Final SEIS.

1.4.4.12 *Supersonic Flight Information*

Comments requested details regarding the level of supersonic training and the altitudes that are projected to be flown by the F-35 aircraft.

Air Force Response:

Details regarding the level of supersonic training and the altitudes that are projected to be flown by the JSF IJTS F-35 aircraft have been added to the SEIS. Please refer to Sections 3.2 and 4.2.

This page is intentionally blank.

2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

In typical environmental impact statements (EISs), Chapter 2 (Description of Proposed Action and Alternatives) begins by describing the Proposed Action. In this Supplemental Environmental Impact Statement (SEIS), however, it is important for the reader to understand that the *Proposed Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions at Eglin AFB, FL Final Environmental Impact Statement* (the FEIS) and the February 2009 Record of Decision (ROD) established a new baseline condition for Eglin Air Force Base (AFB) by authorizing the beddown of 59 F-35 aircraft, associated cantonment construction, and *limited* flight training operations, which is assessed as the No Action Alternative. This differs from the No Action Alternative in the FEIS, which analyzed the potential impacts of not implementing Base Realignment and Closure (BRAC) actions and under which the Joint Strike Fighter (JSF) would not bed down at Eglin AFB. Chapter 2 of this SEIS begins by describing the No Action Alternative (Section 2.1) to provide a basis for understanding the Proposed Action and Alternatives. Section 2.2 presents the Proposed Action, and Section 2.3 explains the Alternatives for beddown and training of F-35 aircraft on the Eglin Reservation.

The February 2009 ROD resulted in a decision to deliver three squadrons of F-35 aircraft (one squadron each for Air Force, Navy, and Marine Corps, for a total of 59 aircraft) and construct some supporting infrastructure at Eglin Main Base. The ROD also concluded that the JSF Academic Training Facility with dormitories, dining facilities, academic training classrooms, and simulators would be located at Eglin Main Base (see Section 2.1).

The Proposed Action and Alternatives in this SEIS include beddown and flight training for the 59 F-35 aircraft without the limitations set forth in the February 2009 ROD.

Although the February 2009 ROD allowed 59 F-35 aircraft to bed down at Eglin Main Base, the aircraft may bed down at another location on the Eglin Reservation.

Sections 2.3.4 and 2.3.5 of this SEIS describe each Alternative and the associated infrastructure requirements and infrastructure locations for that Alternative. Each Alternative would have different levels of auxiliary field use, which would correlate to different flight operations per auxiliary field.

2.1 NO ACTION ALTERNATIVE

The Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1502.14(d) and 32 CFR 989.8(d)) require the alternative analyses in an EIS to "include the alternative of no action." The No Action Alternative for this SEIS includes the 59 F-35 aircraft, the associated cantonment construction, and limited flight training operations that would be implemented at Eglin Main Base as described in the February 2009 ROD. The No Action Alternative includes the beddown of three squadrons: an Air Force squadron with 24 F-35A aircraft, a Marine Corps Fleet Replacement Squadron with 20 F-35B aircraft, and a Navy Fleet Replacement squadron with 15 F-35C aircraft. Delivery of these ROD-approved F-35s at Eglin AFB began in July 2011.

The activities associated with the No Action Alternative are categorized as (1) Personnel, (2) Facilities/Infrastructure, (3) Air Operations, and (4) Ordnance Use. The following provides descriptions of activities under the No Action Alternative within these categories.

2.1.1 Personnel

Under the No Action Alternative, 59 F-35 aircraft would be authorized at Eglin AFB. Table 2-1 lists the maximum number of personnel associated with the JSF that would occur at the installation at any one time.

Table 2-1. Estimated End State Maximum Daily Load of JSF IJTS Personnel at Eglin AFB

Personnel	Number
United States Air Force	671
United States Navy	355
United States Marine Corps	343
United Kingdom	126
Total Military Permanent Personnel	**1,495**
Student Pilots (daily average)	64
Maintenance Students (daily average)	668
Total Military	**2,227**
Contractors	254
Total Daily JSF Personnel	**2,481**
*Dependents**	5,458
Total People New to Area	**7,939**

Source: AETC/A5RJ, 2009

AFB = Air Force Base; IJTS = Initial Joint Training Site; JSF = Joint Strike Fighter

*Due to lack of demographic data for the JSF IJTS program, dependent population estimates were based on Air Force Instruction (AFI) 65-503, A29-1 (fiscal year 2008) data. The overall average of Officer and Enlisted dependents was approximately 2.2 dependents per military member. It was assumed this distribution (2.2 dependents per military member/contractor) was consistent throughout the population.

2.1.2 Facilities/Infrastructure

Under the No Action Alternative, the Air Force would implement the BRAC and the Services' Military Construction (MILCON)-funded programs required to house, feed, and accomplish academic and operational training for both pilot and maintenance students. The projects include but are not limited to construction of dormitories, dining facilities, squadron operations/aircraft maintenance unit (Sqd Ops/AMU) hangars, and the JSF Academic Training Facility.

The JSF Initial Joint Training Site (IJTS) would use the existing munitions storage area (MSA) for the 96th Test Wing (96 TW), which is centrally located for access from either runway. The explosives storage would be within the confines of the existing MSA fence. The proposed operating facilities would be located outside the fence and along the western edge of the MSA. The removal of administration/supervisory buildings 1278, 1284, 1289, and Gazebo J would be required to achieve storage capability. The current parking area for privately owned vehicles (facility 1278C) would change from privately owned to government-owned vehicle parking. The supervisory facilities would be combined into a new supervision building of approximately 7,000 square feet (ft^2) on Perimeter Road, where the gate to the 96 TW area is located.

The facilities associated with the No Action Alternative were previously analyzed in the FEIS, and all construction was authorized by the February 2009 ROD.

2.1.3 Air Operations

Under the No Action Alternative, the F-35 aircraft required to train the instructors and students began arriving in late calendar year (CY) 2011. The Air Force implemented an initial joint training capability and proceeded with basing 59 F-35 aircraft at Eglin Main Base.

On average, approximately 65 sorties would be conducted per day, of which approximately 21 would be for conventional take-off and landing (CTOL) students, 28 for short take-off vertical landing (STOVL) students, and 16 for carrier variant (CV) students. Due to certain military no-fly days, which may not necessarily occur on the same days for each Service, the F-35 aircraft would fly only 232 days in a year. Approximately 15 percent of the total sorties are allocated to continuation training and cost-of-business. Continuation training is associated with maintaining instructor training currency, while cost-of-business addresses instructor proficiency, ferry flights, maintenance checks, etc., associated with the day-to-day training requirements. Pilot training will make up the remaining 85 percent of the sorties.

Table 2-2 illustrates the annual Air Traffic Control operations associated with the No Action Alternative for 59 F-35 aircraft (three squadrons). Appendix E, *Noise*, provides details on the number of flights that would occur on Runway (RW) 01/19.

Table 2-2. Annual Air Traffic Control Operations Associated With the No Action Alternative

Aircraft Type	3 Squadrons (59 Aircraft)		
	Eglin	Duke	Choctaw
F-35	43,071	18,650	20,263
Other	99,289	22,403	75,831
Total	142,360	41,053	96,094

Source: AETC/A5RZ, 2012
Note: "Other" aircraft includes non-IJTS aircraft operating at Eglin AFB

2.1.4 Ordnance Use

The arrival of the F-35 at Eglin AFB will result in an increase in the amount of air-delivered ordnance utilized during training activities. The F-35 has an air-to-air and air-to-ground capability, and pilots will need to train for both.

The proposed F-35 flight training for the No Action Alternative includes air-to-surface delivery of ordnance, including the guided bomb unit (GBU)-12 (live), GBU-12 (inert), and munitions countermeasures unit (MJU)-8/27 flares to targets on the Eglin Range. Some of the required JSF training includes the use of 25-millimeter (mm) ammunition during strafing runs. Most of these strafing events would be associated with basic air-to-ground (BAG) and close air support (CAS) training events. Areas proposed for bombing practice with GBU-12 munitions are within Test Areas (TAs) C-52E and B-82. Training areas proposed for use in air-to-ground gunnery practice (25-mm cannon) are TAs C-62 and B-75. The use of other test areas would require approval by Eglin AFB on a case-by-case basis.

Table 2-3 lists the annual ordnance requirements for training under the No Action Alternative.

JSF students would also expend flares during a portion of their flights. The flares proposed for use include the MJU-8/27. Current procedures for flare use in Eglin Air Force Base Instruction (EAFBI) 11-201, *Air Operations,* would be used during JSF flight training.

Flares may be used over the Eglin Range with a minimum altitude release of 200 feet above ground level (AGL) over TAs and 500 feet AGL over other areas. They may be employed within Warning Area W-151, provided the aircraft is above 1,500 feet AGL or the aircraft is below 1,500 feet AGL and at least 3 nautical miles (NM) from any surface vessel, platform, or land mass.

Table 2-3. Annual Ordnance Requirements for JSF Training for No Action Alternative

Type of Ordnance	Annual Quantity*
GBU-12 (live)	350
GBU-12 (inert)	121
25 mm (TP)	114,977
Flares (MJU-8/27)	752

Source: U.S. Air Force, 2008a
GBU = guided bomb unit; JSF = Joint Strike Fighter; MJU = munitions countermeasures unit; mm = millimeters; TP = target practice
*Annual quantities for 59 aircraft were extrapolated from the annual quantities list that was presented and analyzed in the FEIS.

2.2 PROPOSED ACTION

The Air Force determined that preparing an SEIS would further the purposes of the National Environmental Policy Act (NEPA). This SEIS analyzes the operational alternatives and describes possible mitigations for the full operational capability of the 59 F-35 aircraft authorized to be delivered to Eglin under the February 2009 ROD. The range of reasonable alternatives determined for detailed analysis in this SEIS is not limited by BRAC's goals and objectives.

The Proposed Action is to bed down F-35 aircraft associated with three squadrons. A squadron is the basic organizational unit in the Department of Defense (DoD) Services for flight operations. A squadron may be a mission unit or a functional unit and may vary in size according to responsibility. The composition of a squadron is determined by the type of aircraft it operates and the nature of its mission. The JSF IJTS Air Force squadron would have 24 F-35 aircraft, and the Marine Corps Fleet Replacement Squadron and the Navy Fleet Replacement Squadron would have 20 and 15 F-35 aircraft, respectively. When international partners' F-35 aircraft are at Eglin AFB, associated flight operations will be offset by a reduction in operations of the 59 F-35 aircraft of the U.S. fleet, unless or until subsequent NEPA analysis and documentation has been completed.

The Air Force has evaluated the environmental consequences of the Proposed Action based on the planned F-35 flight operations, not the actual number of F-35 aircraft parked on the ramp at any given point in time. Under some circumstances, more or less than 59 F-35 aircraft could be on the aircraft parking ramp because of:

- Newly manufactured F-35s arriving to replace F-35s that are being assigned to another installation.
- Fluctuation in F-35 aircraft production rates.

Regardless of fluctuations, JSF IJTS F-35 flight operations are not projected to exceed the operational levels stated in Table 2-10 through Table 2-15.

2.2.1 Personnel

The Proposed Action considers the same number of personnel as the No Action Alternative for three squadrons (one Air Force, one Navy, one Marine).

2.2.2 Facilities/Infrastructure

As previously approved in the February 2009 ROD, all support facilities for the IJTS (as outlined in the FEIS), such as dormitories, academic training, and flight simulators, will be located at Eglin Main Base.

Facility needs proposed for the individual Alternatives associated with this SEIS are described for each Alternative in Section 2.3. The requirements vary somewhat for each Alternative, depending on the location and the proximity to other existing facilities. It should be noted that these are subject to modification; site survey and activation details are being further defined and refined as the Air Education and Training Command (AETC) continues coordinating their facility requirements with Eglin AFB. Total acreage and total square footage are estimated and may vary during actual construction.

2.2.3 Air Operations

Analysis of JSF IJTS Alternative 1 of the FEIS was based on the airfield flight operations associated with 107 F-35 aircraft. Since the JSF program is constantly evolving, the training plans have been updated and proposed flight operations have decreased since the February 2009 ROD. The initial operations tables developed by the Joint Program Office (JPO) in late 2006 and early 2007 were an estimate built from early Instructional System Development by Lockheed Martin, data gathered from other training bases, and personal experiences of members of the JPO. The total number of flight operations was based on an early syllabus and basic assumptions on the number of operations a pilot would execute. In addition, there were limited aircraft performance data available.

The initially desired level of Air Force pilot training was not constrained by aircraft availability. The initial planning factor was to train 40 Initial Course Equivalent students per year. The training plans have matured as the intended mission of the aircraft has become better understood, and the expected flight durations to complete the desired training have been revised. The FEIS data used in its JSF IJTS Alternative 1 for 107 aircraft were based on flying the maximum level necessary to train 40 students per Air Force squadron. This inflated the aircraft flight rates to be higher than historically achieved.

Since the FEIS was published, Headquarters (HQ) AETC, the Marine Corps, and the Navy individually reviewed and updated their utilization rates. In the Draft SEIS, AETC estimated that Air Force F-35A aircraft (CTOL) would fly 25 hours per month and constrained the number of students to be trained by that planning factor. In the Revised Draft/Final SEIS, the utilization rates for the CTOL remains at 17 sorties per month per aircraft. In the FEIS, the Marine Corps flight operation tables were initially planned for each student to perform an average of 5.3 landings per sortie. After further analysis on fuel capacity and time available, a new planning factor of 250 landings per student for the entire training was used. Most missions during the tactical phases of the training will be conducted with limited fuel available (which constrains the time available) to perform multiple practice landings. The Draft SEIS introduced a planning factor that reduced the Marine Corps total airfield operations by 30.7 percent from that considered in the FEIS. The utilization rate has matured and evolved during the two-year delay from the published Draft SEIS. The Marine Corps utilization rate used in the Revised Draft/Final SEIS is 27 sorties per aircraft per month, which is a reduction of 2 sorties per aircraft per month from the Draft SEIS.

The Navy had a similar issue as the Marine Corps did in the FEIS. More landings per sortie were initially planned than could be executed during the available time. New guidance from Navy HQ was to develop a training plan that allowed each student to achieve at least 100 landings before beginning the Field Carrier Landing Practice (FCLP) phase. This allowed the average number of landings for the core training to go from 4.5 planned per sortie to approximately 2 per sortie. The FCLP phase has remained the same, with 10 landings per flight. All together, the Navy airfield operations total was reduced by 27.3 percent in the Draft SEIS from what was considered in the FEIS. The utilization rate for the Navy has developed and changed during the two-year delay since the Draft SEIS was published. The Navy utilization rate used in the Revised Draft/Final SEIS is 21 sorties per month per aircraft, which is a reduction of 14 sorties per month per aircraft from the Draft SEIS.

2.2.4 Ordnance Use

The proposed F-35 flight training under the Proposed Action includes delivery of munitions including the Joint Direct Attack Munitions (JDAM) (inert), which include GBU-31, GBU-32 and GBU-38s, GBU-12 (live), GBU-12 (inert), and MJU-8/27 flares to targets on the Eglin Range. Some of the required JSF training includes the use of 25-mm ammunition during strafing runs. Most of these strafing events would be associated with BAG and CAS training events. Training areas proposed for use in air-to-ground gunnery practice (25-mm cannon) are ranges C-62 and B-75. Areas proposed for bombing practice with live GBU-12 munitions are within TA C-52, while inert GBU-12/31/32/38s will be supported on TAs C-52, B-70, and C-72. The use of other TAs would require approval by Eglin AFB or other Range Operating Authority on a case-by-case basis. Table 2-4 lists the annual ordnance requirements for training under the Proposed Action.

Table 2-4. Annual Ordnance Requirements for JSF Training – Proposed Action

Type of Ordnance	Annual Quantity
GBU-12 (live)	36
GBU-12 (inert)	236
GBU-31 (inert)	62
GBU-32 (inert)	79
GBU-38 (inert)	95
25 mm (TP)	114,977
Flares (MJU-8/27)	752

Source: AETC/A5RJ, 2009
GBU = guided bomb unit; JSF = Joint Strike Fighter; MJU = munitions countermeasures unit; mm = millimeter; TP = target practice

2.3 ALTERNATIVES

NEPA and its companion regulations require the Air Force to develop and identify reasonable alternatives to a proposed action. In determining the scope of alternatives to be considered, emphasis is placed on what is "reasonable." Reasonable alternatives include those "that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ, 2010).

The alternatives being considered on the Eglin Reservation require a primary operating base, or Main Operating Base (MOB), from which aircraft depart for training activities and terminate their training activities. The MOB is the location where the aircraft would be launched and recovered; where aircraft maintenance would occur; where the logistical support would be; and where the ramp for nighttime beddown would be.

The alternatives in the FEIS looked exclusively at existing facilities and located the cantonment area (for training and maintenance facilities, hangars, and dorms) in proximity to the main airfield to meet the BRAC goals and objectives of using existing capacity (use of 33rd Fighter Wing and 96 TW areas), reducing costs, and providing synergies. This SEIS is not limited by BRAC's goals and objectives. Alternatives were considered that (1) looked at siting the MOB at locations other than Eglin Main Base; (2) added an additional runway at each of the existing auxiliary fields; and (3) changed the configuration of the Eglin Main Base runway to avoid noise impacts to local areas, such as the city of Valparaiso.

To identify reasonable alternatives, the Air Force developed a three-phase screening process. Phase 1 developed and applied initial screening criteria for the MOB and auxiliary fields. Phase 2 involved presenting the results of the initial screening process at public scoping meetings and considering public input. Phase 3 incorporated additional public and local military user input received after the scoping meetings to develop the alternatives carried forward for detailed analysis.

2.3.1 Initial Alternative Screening Process

The preliminary process to identify locations for the beddown of the aircraft on the Eglin Reservation was accomplished by the Air Force. The process identified 12 possible MOB locations across the Eglin Reservation (Figure 2-1). The existing locations that were considered included Eglin Main Field, Duke Field, Choctaw Field, Hurlburt Field, Field One, Field Two, Field Four, Field Five, Field Six (Camp Rudder), Field Seven, and Field Eight. In addition, the Air Force also proposed building a new airfield in the northwest corner of the Eglin Reservation.

2.3.1.1 *Main Operating Base*

The Air Force conducted the initial screening using the following three criteria:

- Operational feasibility
- Capacity
- Range sustainment

Operational feasibility within the Eglin Major Range Test Facility Base (MRTFB) (which is described in Section 1.2.1 of the FEIS) is the ability to operate an airfield within the existing safety constraints. These safety constraints involve range hazard areas, restricted airspace, and areas with either potential or probable unexploded ordnance (UXO). Placing the airfield within existing safety constraints limits the capability of the MRTFB.

Capacity is the ability to accommodate all mission requirements within:

- Terminal areas;
- Mission Special Use Airspace (SUA), which includes restricted airspace specifically designated for hazardous activities; and
- Existing frequency spectrum.

Range sustainment is the ability to conduct F-35 operations in addition to all other customer missions on the Eglin MRTFB. This includes current and future predicted range operations.

2.3.1.1.1 Operational Feasibility

Eglin AFB is a national DoD asset because it provides a unique environment for research, development, testing, and evaluation of conventional munitions and electronic systems. The increase in training activities on the Eglin Range poses new considerations for the continued operation of Eglin as an MRTFB.

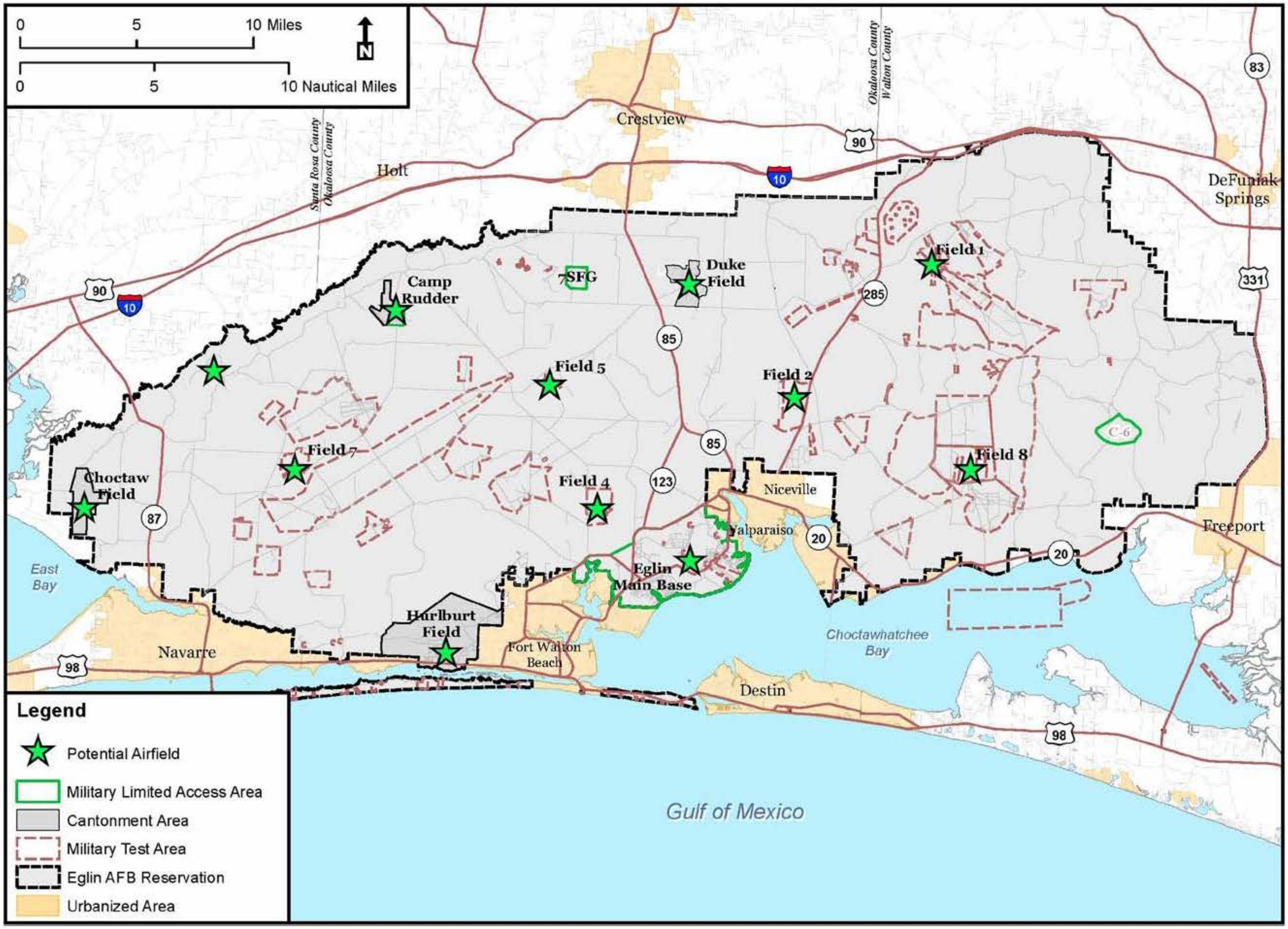


Figure 2-1. Potential Airfield Alternatives

The Air Force used three basic questions as a foundation for their analyses:

1. What are the operationally feasible alternatives for beddown and operation of JSF on the Eglin Reservation?
2. How many JSF can operate within the feasible alternatives?
3. Of the operationally feasible alternatives, which are more preferable from an overall operational standpoint that would accommodate all customers of the MRTFB?

During the operational feasibility screening, airfields located in range hazard areas were eliminated as potential alternatives. The eliminated airfields included Field One, Field Two, Field Four, Field Five, Field Six, Field Seven, and Field Eight. Hurlburt Field was eliminated because it lies within restricted airspace and is routinely subject to closure. However, areas underneath infrequently used safety profiles (the ground and airspace areas designated for vertical and lateral containment of weapons and explosive devices) within the North/South Corridor were not eliminated. (Figure 1-4 in the FEIS depicts the North/South Corridor.)

Figure 2-2 illustrates those potential alternative airfields in range hazard areas.

The proposed new airfield in the northwest corner of the Eglin Reservation was sited to avoid UXO contamination, but was eliminated for further consideration because it was located in a range hazard area. UXO contamination by itself did not eliminate any of the potential alternatives. The three remaining potential anchor locations for the MOB were Eglin Main Base, Duke Field, and Choctaw Field.

After this initial safety screening, a list of 18 candidate alternatives was developed using the three potential anchor locations. Those 18 alternatives were then analyzed for capacity. Capacity was measured as the total number of JSF Air Force squadrons that could successfully complete the training within the four major areas identified for operational feasibility, as described in the following section.

2.3.1.1.2 Capacity

The Air Force considered the following areas when evaluating Eglin Main Base, Duke Field, and Choctaw Field for capacity: terminal areas, mission SUA, and frequency management.

The capacity analysis for terminal areas evaluated the airspace directly related to airfield operations, e.g., takeoffs, landings, low approaches, touch-and-go landings, and instrument departures/arrivals. Terminal area capacity analysis for the F-35 determined that all current and projected users would still be able to accomplish their specific mission requirements in the terminal areas.

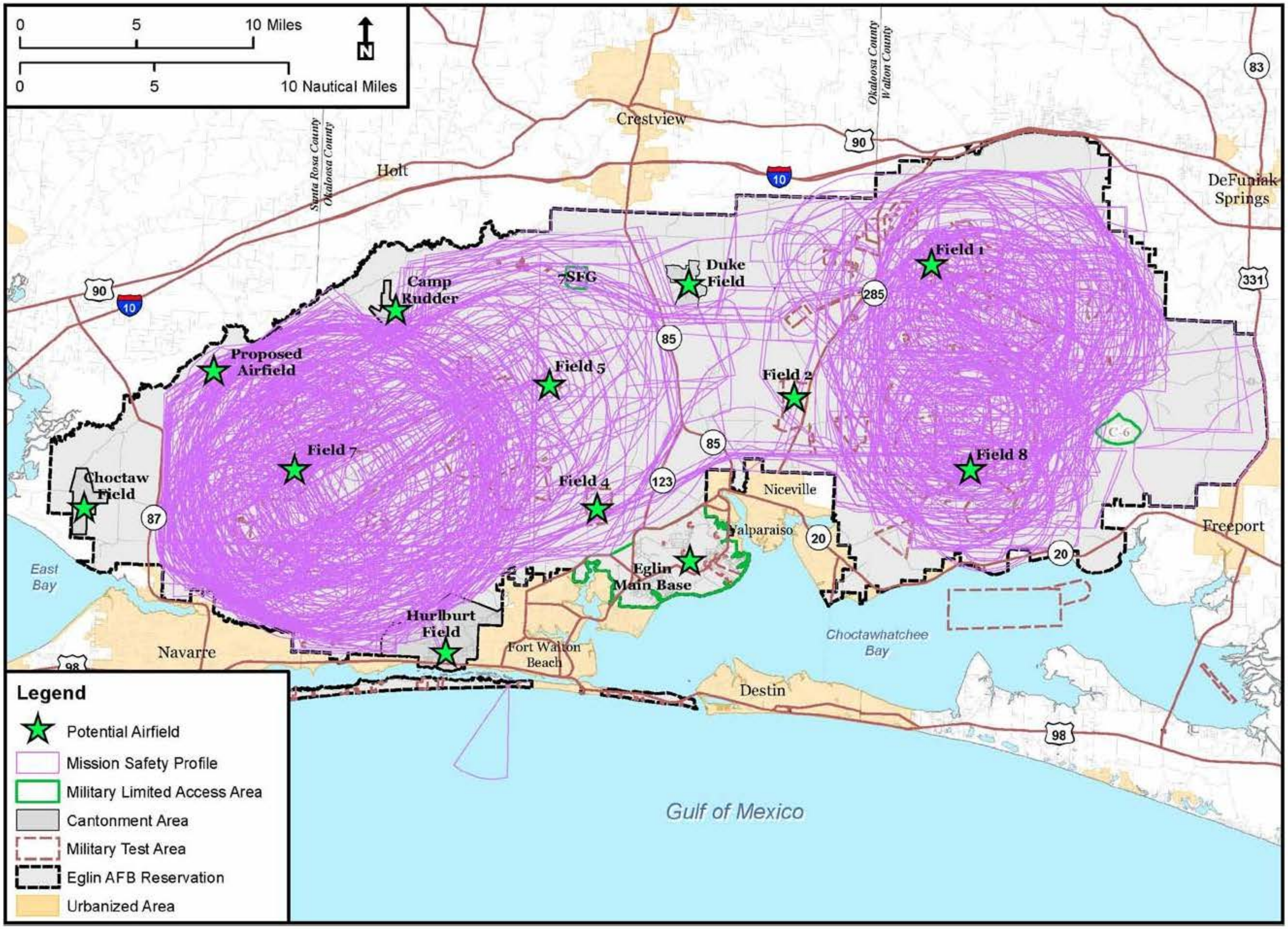


Figure 2-2. Potential Airfields and Range Hazard Areas

The Gulf Regional Airspace Strategic Initiative (GRASI) conducted mission capacity analysis for all regional SUA. At that time, modeling for mission capacity indicated that the mission airspace configuration would not support more than 59 JSF aircraft.

The capacity analysis for frequency management was limited to the existing available radio frequency spectrum in the region.

Terminal Airspace: Based on the flight operations requirements of the JSF pilot training program (Section 2.2.3), the Air Force determined that Eglin Main Base and Duke Field had sufficient terminal area capacity to accommodate 59 F-35s. However, the Air Force had concerns about the airspace in the vicinity of Choctaw Field. Existing high-volume military training and civilian aircraft traffic in the vicinity of Whiting Field and Pensacola Regional Airport would conflict with projected F-35 operations with Choctaw Field as the MOB. In addition, adding a precision approach (which is required at the MOB and requires additional airspace) would exacerbate the conflicts. Despite these concerns, the Air Force considered the Choctaw Field alternative as a potential MOB, pending further analysis (Section 2.3.2).

Mission SUA: Current modeling of growth in competing missions and better refinement of the JSF training program indicates that more than 59 JSF aircraft cannot be supported in the current mission airspace configuration. As the JSF training program and growth in all competing missions continues to mature, adaptive management will be required to ensure that the military value of the MRFTB for all Eglin customers is maintained.

Frequency Management: There is sufficient frequency capacity to support all remaining candidate locations.

2.3.1.1.3 Range Sustainment

Range sustainment was evaluated based on three major issues: future airspace congestion, interfacility transfer, and range hazardous operations areas. *Airspace congestion* was measured based on the expected increase in overall operations and the currently projected commercial and general aviation traffic in the airspace that would be impacted by the JSF flight operations. *Interfacility transfer* refers to movement between airfields on the Eglin Reservation. Interfacility transfer between airfields was examined, recognizing that fewer facilities equates to lower Air Traffic Control workload, less fuel consumed, and potential for increased training time during the average sortie duration. By limiting the number of interfacility transfers, the Air Force can maximize the use of the Range for all customers. The *range hazardous operations area* analysis reviewed the long-term viability of the MRTFB mission. This analysis was a qualitative risk assessment. It determined the impacts of all operations (both flight and ground) on restricted areas. It evaluated the risk of eventual loss of size or throughput for hazard area due to unforeseen mission increases, foreseeable conflicts with developed areas, or aviation congestion. This included evaluating whether JSF airfield operations would be impacted by range hazard areas. Range sustainment analysis supports all remaining candidate locations.

The Range Operating Authority evaluation determined that from a strictly range sustainment perspective, Duke Field parallel runway options would be the most preferable. This would ensure effective and efficient integration of all JSF operations with existing customers to sustain and continue operating Eglin as an MRTFB.

2.3.1.1.4 Main Operating Base Results

Based on the initial screening process, the Air Force found three airfields that could potentially function as a MOB: Eglin Main Base, Duke Field, and Choctaw Field. These three airfields all met operational feasibility, capacity, and range sustainment criteria based on JSF training requirements. The other nine locations failed to meet the operational feasibility criteria because they were within range hazard areas.

2.3.1.2 Auxiliary Fields

After completing the MOB analysis, the Air Force studied potential locations for JSF auxiliary fields. An auxiliary field is an airfield used in a subsidiary (not primary) capacity. The term *auxiliary field* is used by the Air Force to describe regional airfields in addition to the MOB that are used to support terminal area training operations. Similarly, the Navy uses the term *outlying field* (OLF) to refer to the same type of training airfields. These airfields may be directly owned and operated by the organization and/or service operating from a main base, or they may be owned and operated by other agencies or organizations and used through a lease or other form of agreement. Five primary requirements were identified as the focus of the auxiliary field identification process and are considered criteria to determine which auxiliary fields are viable. To be considered viable, an auxiliary field must fulfill the following five requirements:

- Between sea level and 3,000 feet above mean sea level (MSL);
- Runway lengths at a minimum of 8,000 feet;
- Within 50 NM from the MOB;
- Field availability for 18 to 24 hours per day; and
- Must be used by military aircraft and be capable of being secured. No airfields designated as civilian, Air National Guard, or Air Reserve were considered for use as an auxiliary field.

Due to airspace congestion, there may be times during JSF training activities when JSF pilots who are already en route have to wait before entering designated training airspace until other aircraft have left that airspace. Also, JSF training activities include a variety of mission requirements that take them out of the local Eglin Reservation airspace and away from local auxiliary fields. During these waiting periods and during the infrequent times when it is impractical to immediately return to auxiliary fields for uninterrupted training, the trainees may use that time for practice approaches at various airfields that would be convenient to the JSF's locale. In these cases, pattern training requirements (especially instrument training) could be accomplished on a "drop-in," noninterference basis at airfields across the region. These airfields would not be considered auxiliary fields but are known as Practice Instrument Approach Fields (PIAFs). Naval Air Station (NAS) Pensacola and Tyndall AFB would be the only airfields used as PIAFs.

Figure 2-3 through Figure 2-5 illustrate the potential auxiliary fields that are within 50 NM of each anchor alternative. Table 2-5 provides detailed information regarding the auxiliary fields that meet all of the screening criteria outlined in Section 2.3.1.

The following auxiliary fields were eliminated from consideration for detailed analysis because they did not meet all of the screening criteria for auxiliary fields outlined in Section 2.3.1.

Atmore Municipal
Carl Folsom
Barin Navy Outlying Field (NOLF)
Blackwater Airfield
Brewton Municipal
D.W. McMillian Memorial Hospital
DeFuniak Springs
Destin-Fort Walton Beach
Eglin Auxiliary Field 6
Eglin Test Site B6
Enterprise Municipal
Ferguson
Florala Municipal
Foley Municipal
Geneva Municipal
Harold NOLF
Holley NOLF
Jack Edwards
Jay Hospital
Logan Field
Pace NOLF
Panama City Bay County International
Pensacola Regional
Peter Prince Field
Santa Rosa NOLF
Saufley Field NOLF
South Alabama Regional at Bill Benton Field
Spencer NOLF
Summerdale NOLF
TAC X Stagefield AHP
Tri-County Bonifay
Whiting Field, NAS North
Whiting Field, NAS South

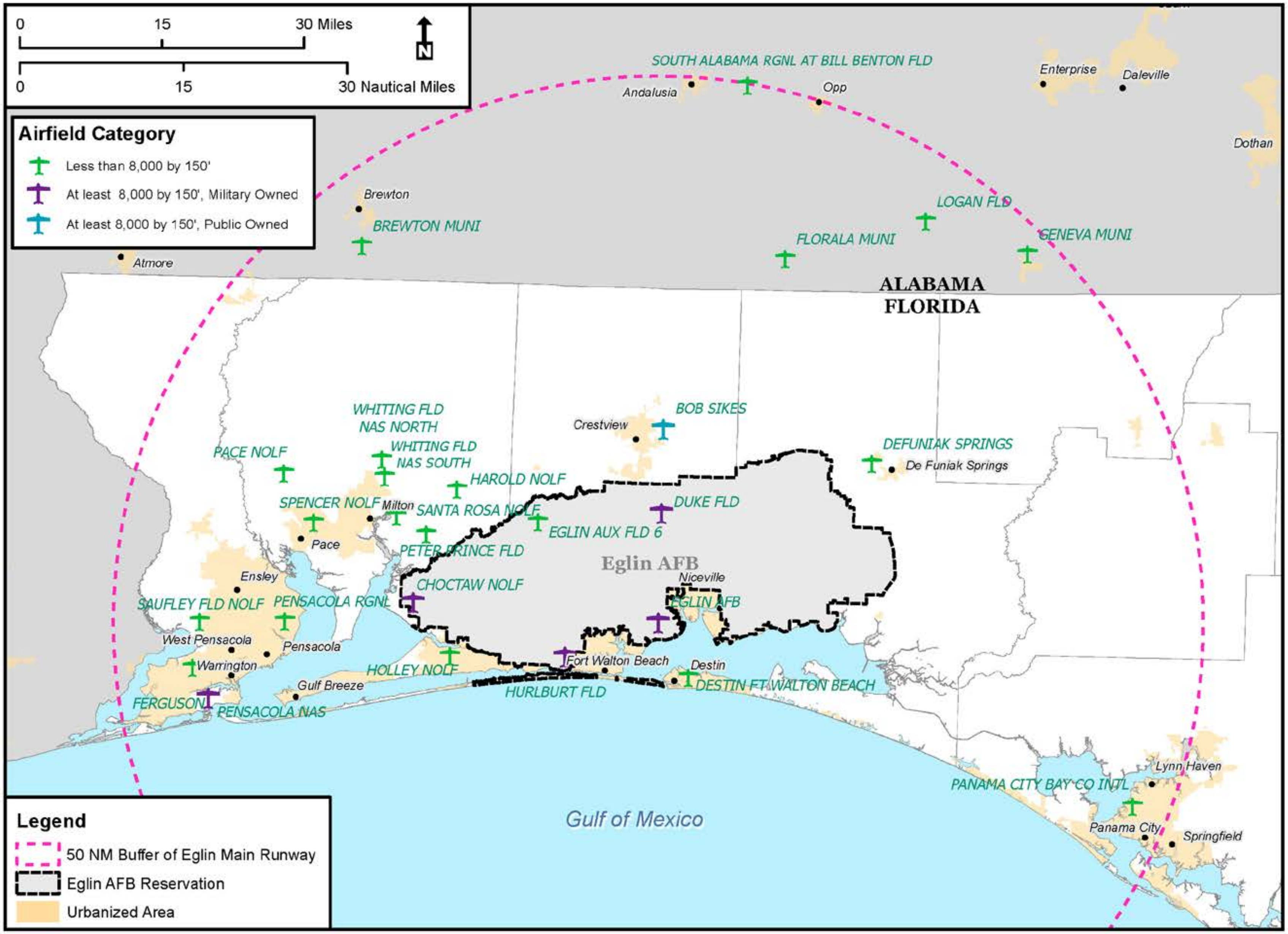


Figure 2-3. Potential Auxiliary Fields Within 50 NM of Eglin Main Base

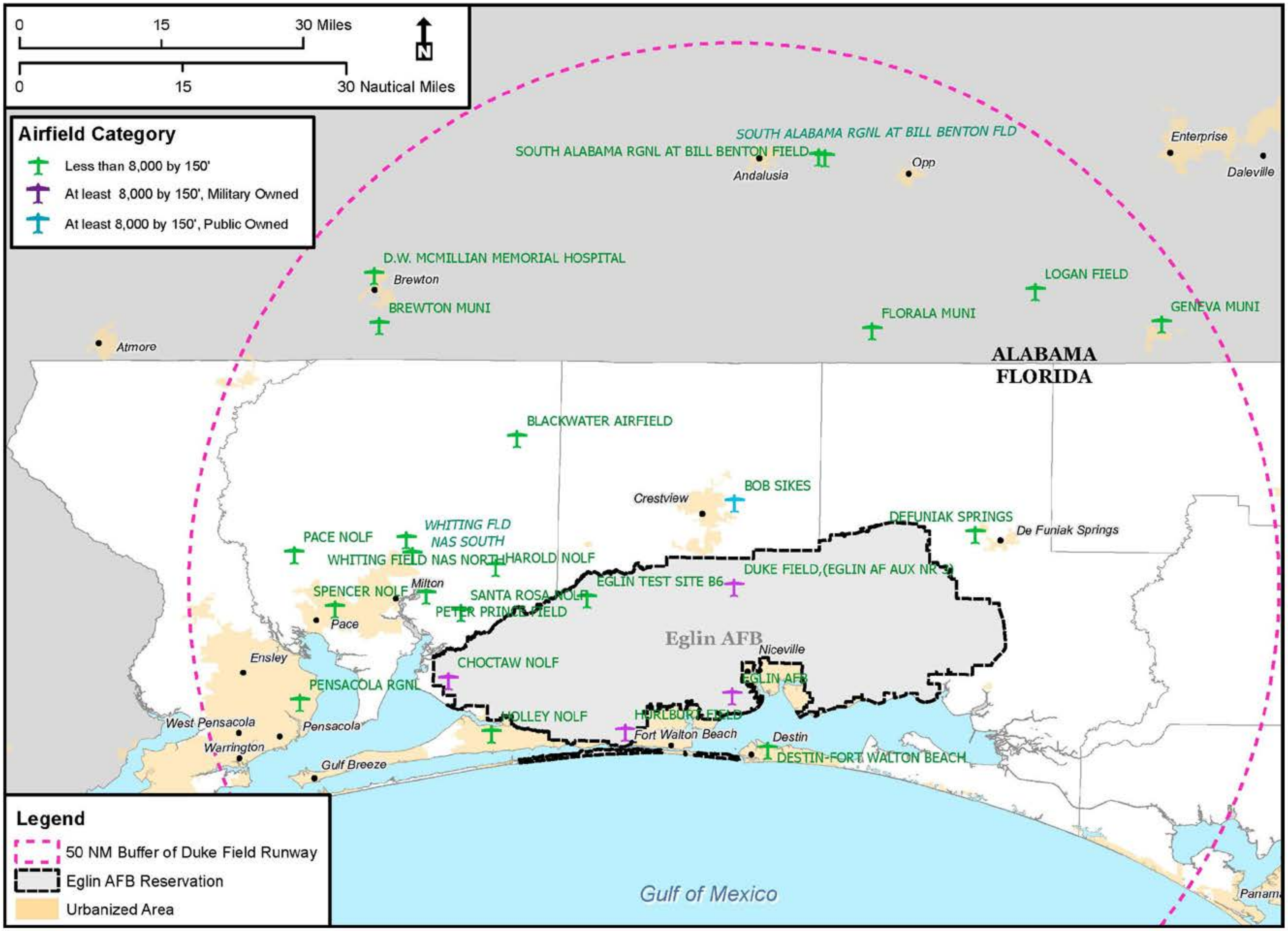


Figure 2-4. Potential Auxiliary Fields Within 50 NM of Duke Field

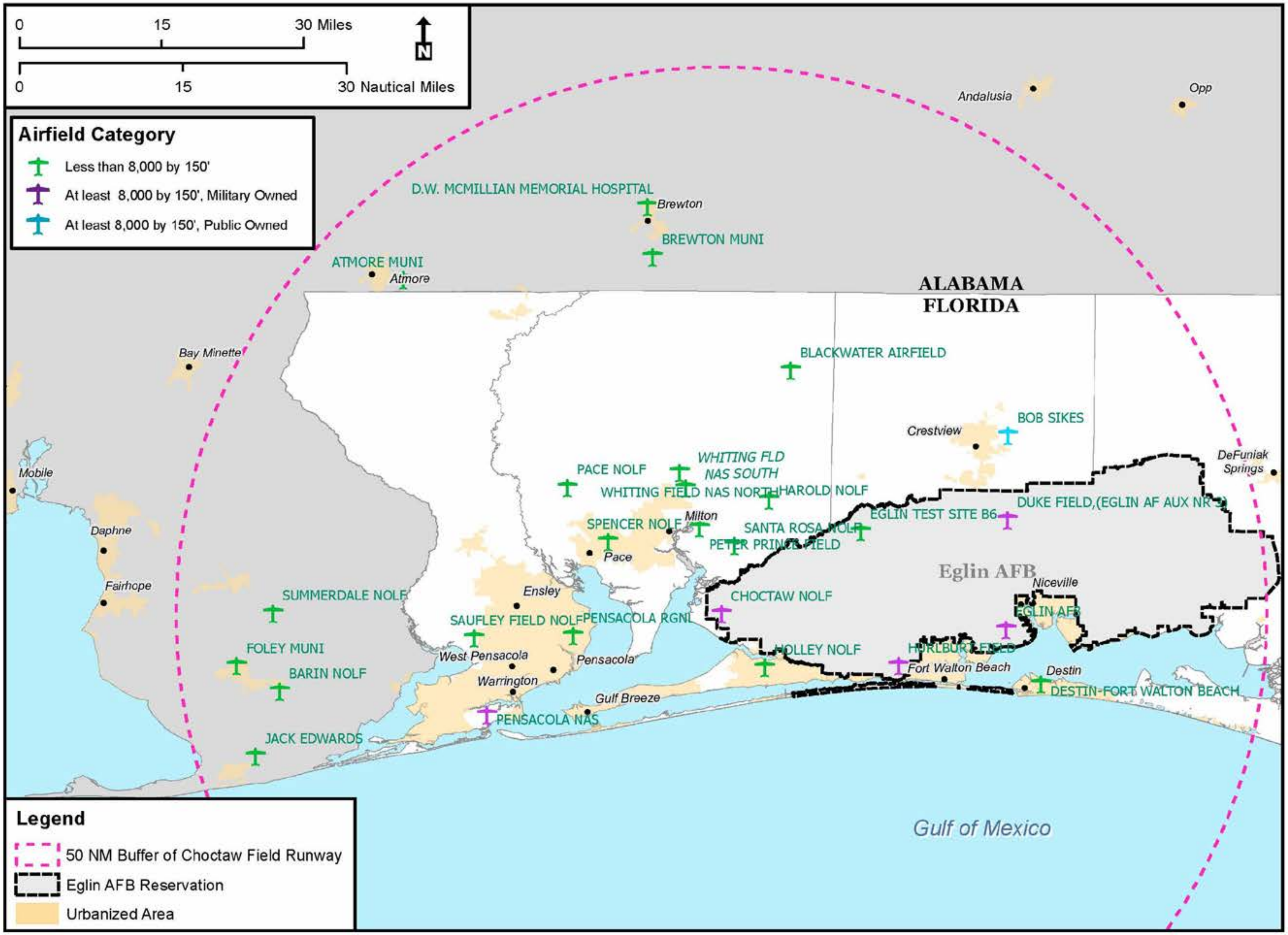


Figure 2-5. Potential Auxiliary Fields Within 50 NM of Choctaw Field

Table 2-5. Airfields Considered for Use as an Auxiliary Field for JSF Training

Name	FAA Identifier	Elevation (ft)	Approximate Size (ft)	Owner	Compared with Runway Criteria
From Eglin Main Base					
Choctaw Field (NOLF)	NFJ	102	8,000 x 150	U.S. Navy	≥ 8,000 by 150 ft
Duke Field	EGI	191	8,000 x 150	U.S. Air Force	≥ 8,000 by 150 ft
Hurlburt Field	HRT	38	9,600 x 150	U.S. Air Force	≥ 8,000 by 150 ft
NAS Pensacola	NPA	28	8,000 x 200	U.S. Navy	≥ 8,000 by 150 ft
From Duke Field					
Choctaw Field (NOLF)	NFJ	102	8,000 x 150	U.S. Navy	>8,000 by 150 ft
Eglin Main (RW 01/19)	VPS	87	10,012 x 300	U.S. Air Force	>8,000 by 300 ft
Eglin Main (RW 12/30)	VPS	87	12,005 x 300	U.S. Air Force	>8,000 by 300 ft
Hurlburt Field	HRT	38	9,600 x 150	U.S. Air Force	>8,000 by 150 ft
NAS Pensacola	NPA	28	8,000 x 200	U.S. Navy	≥ 8,000 by 150 ft
From Choctaw Field					
Eglin Main (RW 01/19)	VPS	87	10,012 x 300	U.S. Air Force	>8,000 by 300 ft
Eglin Main (RW 12/30)	VPS	87	12,005 x 300	U.S. Air Force	>8,000 by 300 ft
Duke Field	EGI	191	8,000 x 150	U.S. Air Force	≥ 8,000 by 150 ft
Hurlburt Field	HRT	38	9,600 x 150	U.S. Air Force	≥ 8,000 by 150 ft
NAS Pensacola	NPA	28	8,000 x 200	U.S. Navy	≥ 8,000 by 150 ft

Source: The original source spatial data for runways came from the National Geospatial-Intelligence Agency (National Geospatial Intelligence Agency, 2007) and the runway dimension attribution came from the FAA based on information provided on the following website: http://www.airnav.com/airports.
> = greater than; ≥ = greater than or equal to;FAA = Federal Aviation Administration; ft = feet; JSF = Joint Strike Fighter; NAS = Naval Air Station; NOLF = Navy Outlying Field; U.S. = United States

2.3.1.2.1 Auxiliary Field Results

Based on the auxiliary field analysis, the Air Force determined that four auxiliary fields were suitable for an Eglin Main Base, a Duke Field or a Choctaw Field MOB (Table 2-5). However, the Air Force eliminated Hurlburt Field and NAS Pensacola for use as high-volume auxiliary fields because they are considered to be too busy and their use would not be compatible with existing aircraft. NAS Pensacola and Tyndall AFB would be the only airfields used as PIAFs.

2.3.1.3 *Summary of Initial Screening Results*

The initial alternative screening analysis resulted in three potential MOB locations and two potential auxiliary fields for each anchor alternative. The Air Force looked at a combination of these that resulted in 18 candidate alternatives for JSF beddown, which represented a reasonable range of alternatives. These alternatives presented environmental impacts that varied enough to provide both the public and the decision maker with valuable information with which to make comparisons. Thus, these alternatives cover the "full spectrum of alternatives" required for analysis under 32 CFR 989.8(b).

The 18 candidate alternatives were variously grouped under one of three primary, or "anchor," locations that could support the MOB airfield requirements: Eglin Main Base, Duke Field, or Choctaw Field. The 18 candidate alternatives were presented to the public during the August 2009 public scoping meetings and are shown in Table 2-6.

Table 2-6. Candidate Alternatives Presented at SEIS Scoping Meetings

Anchor Alternative 1 – Eglin Main	
1A	No change to the existing runways; Duke and Choctaw auxiliary fields
1B	Adjust Runway 19 to 16; Duke and Choctaw auxiliary fields
1C	Expansion with parallel runways; Duke auxiliary field
1D	Expansion with parallel runways; Choctaw auxiliary field
1E	Expansion with parallel runway; Duke and Choctaw auxiliary fields
1F	Move Runway 19 threshold; Duke and Choctaw auxiliary fields
1G	Raise the Runway 19 IAP; Duke and Choctaw auxiliary fields
1H	Move Runway 19 south; Duke and Choctaw auxiliary fields
Anchor Alternative 2 – Duke Field	
2A	Parallel Runways and LHA; Choctaw auxiliary field
2B	Parallel Runways and LHA; Eglin 12 auxiliary field
2C	Parallel Runways and LHA; Eglin 12 and Choctaw auxiliary fields
2D	Single Runway; Eglin 12 and Choctaw auxiliary fields
2E	Single Runway; Choctaw auxiliary field
Anchor Alternative 3 – Choctaw Field	
3A	Parallel Runways and LHA; Duke auxiliary field
3B	Parallel Runways and LHA; Eglin 12 auxiliary field
3C	Parallel Runways and LHA; Eglin 12 and Duke auxiliary fields
3D	Single Runway and LHA; Eglin 12 and Duke auxiliary fields
3E	Single Runway and LHA; Duke auxiliary field

IAP = Initial Approach Pattern; LHA = Landing Helicopter Amphibious; SEIS = Supplemental Environmental Impact Statement

Efforts were made to develop candidate alternatives that would reduce the use of Eglin Main RW 01/19. Therefore, alternatives that included a MOB at Duke Field or Choctaw Field used Eglin Main as an auxiliary field and specifically referenced the use of Eglin Main RW 12. However, after public scoping, it was recognized that JSF operations must still utilize RW 01/19 to accomplish their mission because RW 01/19 is the primary runway for instrument flight rules (IFR) activities, while RW 12/30 is the primary runway for visual flight rules (VFR) activities. Although the Air Force will utilize RW 01/19, the predominant number of JSF operations would occur on RW 12/30 when Eglin Main is used as an auxiliary field. Therefore, throughout this SEIS, Eglin Main RW 12 may be referenced as, but will not be, the sole runway used in the alternatives being carried forward for detailed analysis. Each candidate alternative is discussed in more detail in Section 2.3.2, Alternatives Considered But Eliminated From Detailed Analysis, or Section 2.3.3, Alternatives Carried Forward for JSF Beddown, as applicable.

2.3.2 Alternatives Considered But Eliminated From Detailed Analysis

2.3.2.1 *Alternatives Changed to Mitigations*

After the scoping meetings, the Air Force determined that Alternatives 1F (Move RW 19 Threshold) and Alternative 1G (Raise RW 19 Initial Approach Pattern) should not be considered as alternatives but instead should be evaluated as mitigations. These mitigations could be implemented in conjunction with any of the other proposed alternatives that utilize Eglin Main Base. These mitigations are addressed in the mitigation section (Section 2.6) and if deemed appropriate will be incorporated in the SEIS ROD.

2.3.2.2 *Additional Alternatives Considered*

There are numerous possible variations of the analyzed reasonable alternatives. Shortly after the public scoping meetings, the Air Force briefly considered adding two additional alternatives, "1J" and "1K." Alternative 1J would have proposed beddown of the F-35 at Eglin Main Base with only initial takeoffs and final landings occurring at Eglin Main. All other operations would be conducted at either Duke Field or Choctaw Field. Alternative 1K would have bedded down and operated Air Force F-35s at Eglin Main Base and the Navy and Marine Corps F-35s at Duke Field. These alternatives were not carried forward for further analysis, as it became apparent that, as with the many other potential alternative variations, these two alternatives would not give the public or the decision maker substantially different or more useful information than the range of alternatives already chosen for detailed analysis.

2.3.2.3 *Additional Analysis of Candidate Alternatives*

After considering public scoping comments, Air Force operational, safety, and airfield planning specialists evaluated the candidate alternatives for airfield planning criteria.

2.3.2.3.1 Airfield Planning

The Air Force studied all the candidate alternatives carried forward to determine their compatibility with airfield planning criteria. The airfield planning criteria used were:

- Site constraints.
- Incompatible land use.
- Relocation of substantial infrastructure.

Site Constraints

The Air Force analyzed the candidate alternatives for obstructions, built up areas, neighboring airports, topography, and soil conditions (DoD, 2006a: Unified Facilities Criteria 3-260-01).

Incompatible Land Use

The Air Force looked specifically at whether existing infrastructure would create unacceptable land use constraints for clear zones (CZs) and accident potential zones (APZ I and APZ II) (Air Force Instruction [AFI] 32-7063). The Air Force uses Air Force Handbook (AFH) 32-7084, *Air Installation Compatible Use Zones (AICUZ) Program Manager's Guide,* to implement AFI 32-7063. The CZ starts at the end of the runway and extends outward 3,000 feet. It has the highest incident of accidents of the three zones. The Air Force adopted a policy of acquiring property rights to areas designated as CZs due to the high accident potential. APZ I extends from the CZ an additional 5,000 feet and APZ II extends from APZ I an additional 7,000 feet. Each area has a lesser accident potential. The CZs and APZs currently at Eglin Main Base were originally established in 1976 and would not change as a result of the beddown of the F-35. For homes and structures currently in those areas, the Air Force AICUZ program already applies.

AFH 32-7084 Attachment 3 provides a detailed discussion of CZs and APZs. Specifically, AFH 32-7084 discusses what land uses are appropriate in the CZ, APZ I and APZ II. AFH 32-7084 specifies that the Air Force must not plan, locate, or construct a new use or facility within the boundaries of the CZ. While more activities are permitted within an APZ I, AFH 32-7084 indicates that uses that concentrate people in small areas are not acceptable. APZ II uses that result in high-density office uses are not considered appropriate. Existing Air Force facilities and land use may continue in the CZs, with a waiver from the installation's Major Command. However, new facilities must be constructed outside CZs, APZ I, and APZ II, except as permitted by Unified Facilities Criteria 3-260-01.

Based on these criteria, the Air Force will not construct a new runway or new facilities at a location that would require a waiver, when suitable alternatives not requiring a waiver exist. Therefore, an alternative was not carried forward for detailed analysis if it would require an airfield waiver for new construction efforts.

Relocation of Substantial Infrastructure

The Air Force evaluated all candidate alternatives to consider whether selection would unreasonably affect existing missions or create unreasonable cost. Eglin AFB has numerous missions in addition to the JSF IJTS that must continue at their current pace to meet DoD requirements. Because of this, the Air Force excluded alternatives that would require demolition and reconstruction of facilities that would delay mission readiness. Additionally, the Air Force excluded alternatives that would create unreasonable cost.

Application of Airfield Planning Criteria to Eglin Main Base

The Air Force carried forward candidate Alternative 1A. Alternative 1A does not have any new site constraints nor does it require relocation of substantial infrastructure. A new alternative, Alternative 1I, was created and carried forward for detailed analysis (refer to Section 2.3.4). Candidate Alternatives 1B, 1C, 1D, 1E, and 1H were eliminated. Eliminated candidate alternatives are discussed in this section.

Alternative 1B (Adjust Eglin Main Runway 19 to 16)

Alternative 1B would require construction of a new runway between the two existing runways at Eglin AFB.

Site constraints eliminated Alternative 1B due to a 1,000-foot-wide ravine on the northern end of the proposed runway (Figure 2-6). Incompatible land use also eliminated Alternative 1B. Construction of the new runway would result in placing Florida Highway (Hwy) 85 in the proposed runway's northern CZ. The proposed runway would also place Eglin Boulevard in the runway's southern CZ. Eglin Boulevard is the main transportation thoroughfare for Eglin Main Base, which accommodates an average annual daily traffic load of 16,000 vehicles.

In addition, utility infrastructure under the proposed runway (Figure 2-7 and Table 2-7) would require relocation so that any repairs of the infrastructure would not impact mission readiness by limiting runway usage.

In addition to the incompatible land uses, Alternative 1B would require relocation of the existing 315 acres of the MSA and the High Explosive Research and Development areas. The MSA requires a considerable Quantity-Distance buffer zone and must be located in proximity to munitions loading operations. There is no suitable site to relocate the MSA without severe munitions handling operational impacts, since the MSA must be within close proximity to the beddown location.

Alternatives 1C, 1D, and 1E (Eglin Main Expansion with Parallel Runways)

Alternatives 1C, 1D, and 1E all would share the same design feature in that they would require the construction of two new parallel runways to the northwest of the existing runways and Eglin Main Base (Figure 2-8). These alternatives would only differ in their use of auxiliary fields.

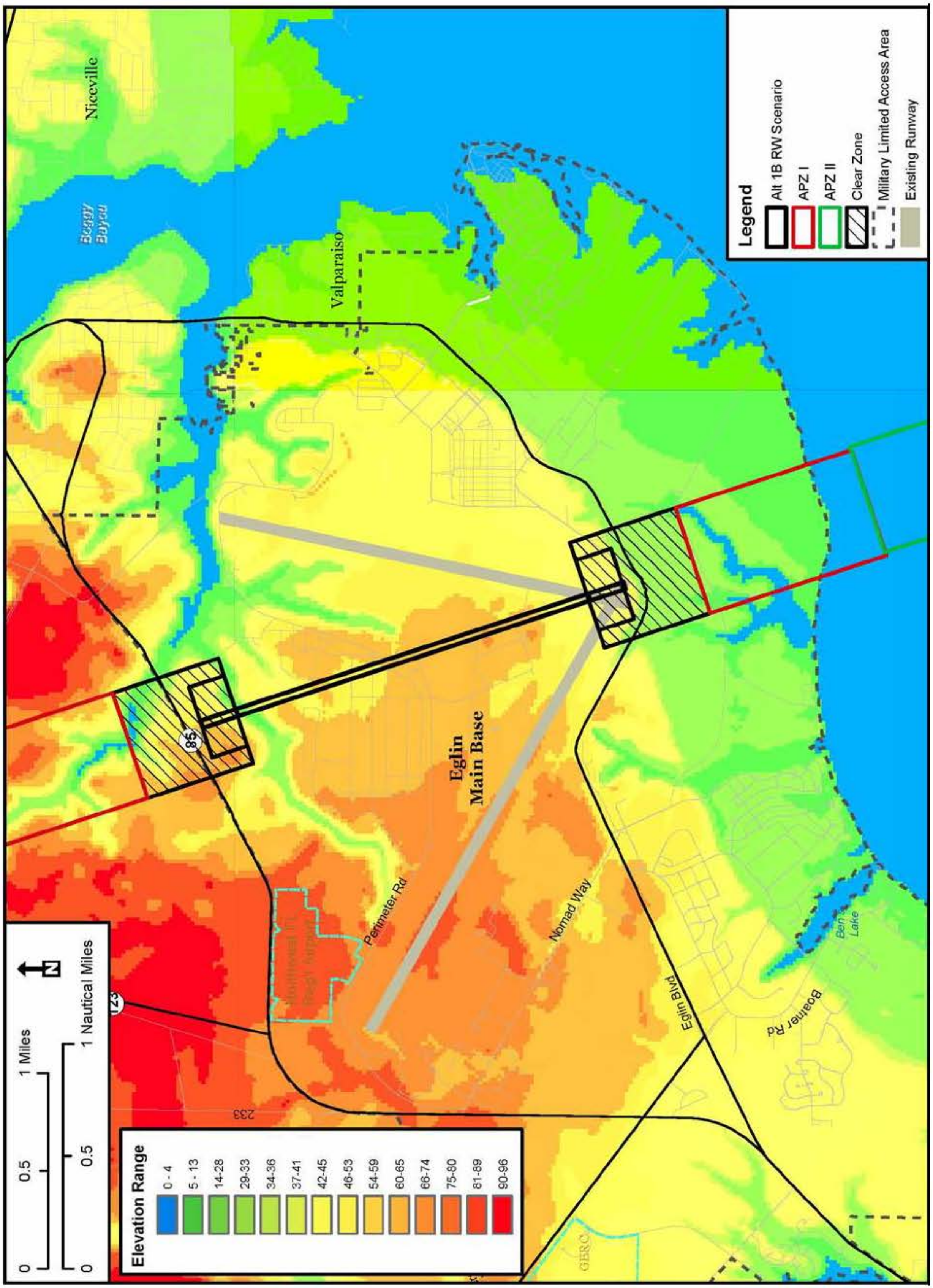


Figure 2-6. Alternative 1B – Proposed Runway Location with Topography

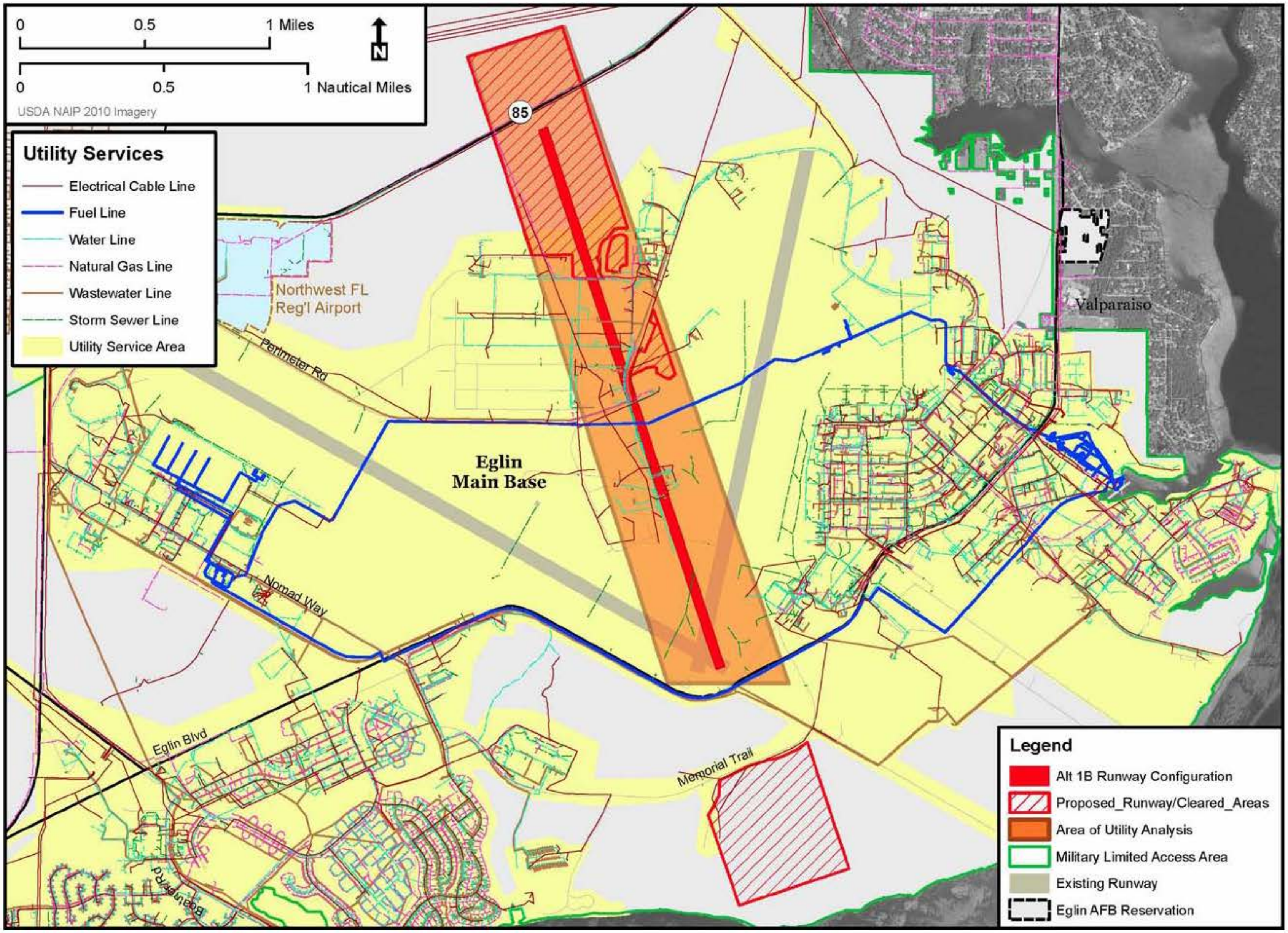


Figure 2-7. Utilities at Eglin Main Base and Alternative 1B Areas

Table 2-7. Utility Infrastructure Under Proposed Runway – Alternative 1B

Type of Utility	Diameter of Utility Line	Linear Feet	Number of Lines
Water	1–3"	5,674	17
Water	6–8"	6,158	21
Water	8–12"	10,321	34
Water	Unknown	2,196	4
	Total Water	**24,349**	**76**
Wastewater	4–6"	2,507	25
Wastewater	8"	3,313	4
Wastewater	12"	925	1
Wastewater	Unknown	218	3
	Total Wastewater	**6,963**	**30**
Storm water	12–18"	1,012	9
Storm water	21–24"	1,799	10
Storm water	30–42"	1,184	6
Storm water	66–72"	1,955	2
Storm water	Unknown	791	11
	Total Stormwater	**6,741**	**38**
Fuel	8"	2,364	1
	Total Fuel	**2,364**	**1**
Natural gas	0.75–1.25"	1,300	11
Natural gas	2"	276	2
Natural gas	6"	2,180	2
Natural gas	Unknown	9,859	14
	Total Natural Gas	**13,615**	**29**
Electrical	Unknown Voltage	28,878	47
	Total Electrical	**28,878**	**47**

Site constraints, specifically topography (Figure 2-9), would prevent moving the runways for Alternatives 1C, 1D, and 1E into any other practical configuration. Construction of the parallel runways in the location originally proposed during the scoping phase of the SEIS would create an incompatible land use by placing the CZ over Hwy 85 and Hwy 123 to the south of the easternmost parallel runway.

Additionally, the easternmost runway would place the APZ II over the hospital on base, which is an impermissible land use according to AFH 32-7084. The Air Force evaluated numerous runway orientations to minimize impacts from CZs and APZ I and II. The Air Force concluded that no other parallel runway configurations would alleviate the land use impacts associated with the original parallel runway orientation. For these reasons, Alternatives 1C, 1D, and 1E were eliminated from further consideration.

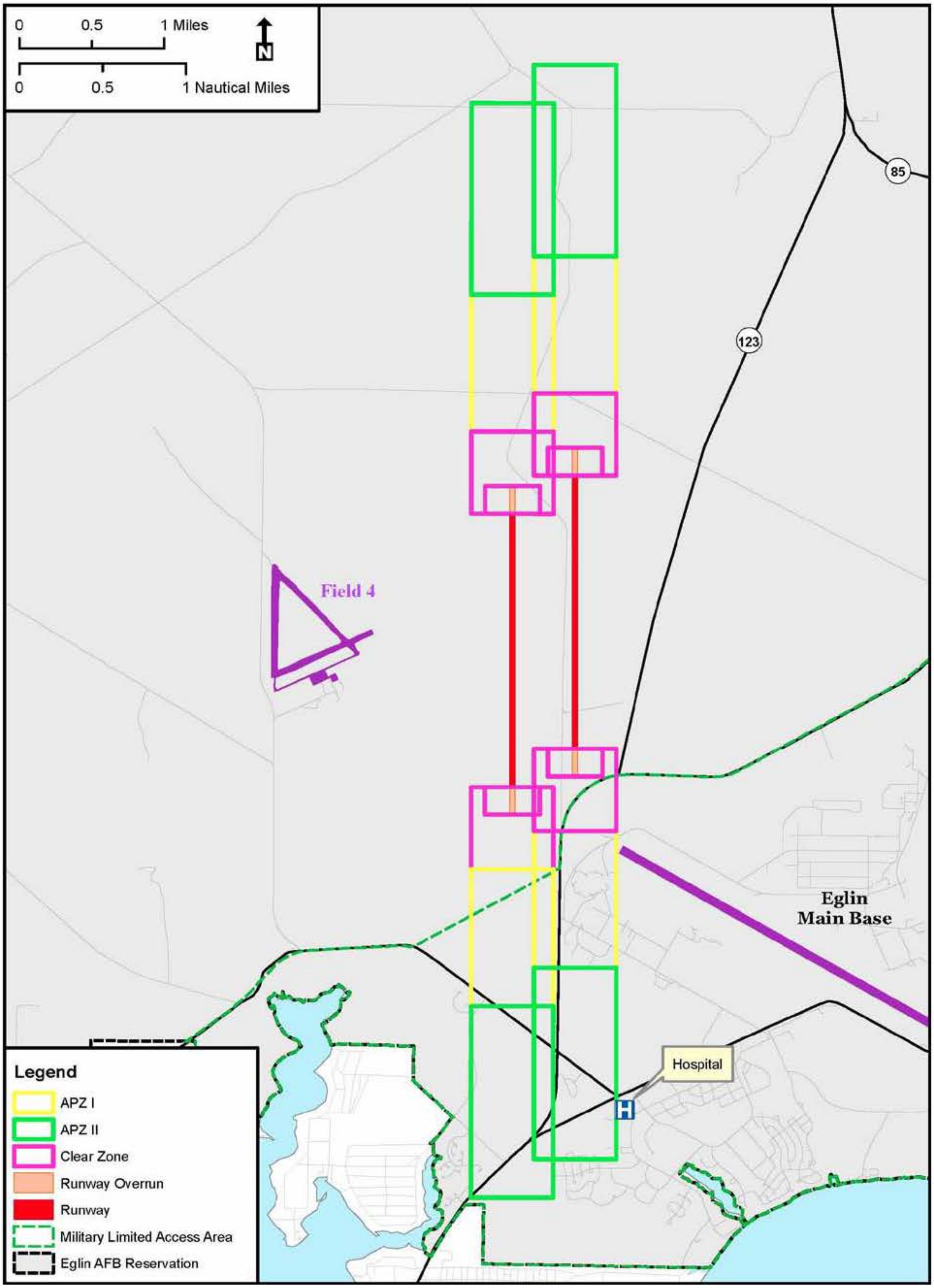


Figure 2-8. Alternative 1 – Parallel Runways at Eglin Main Base

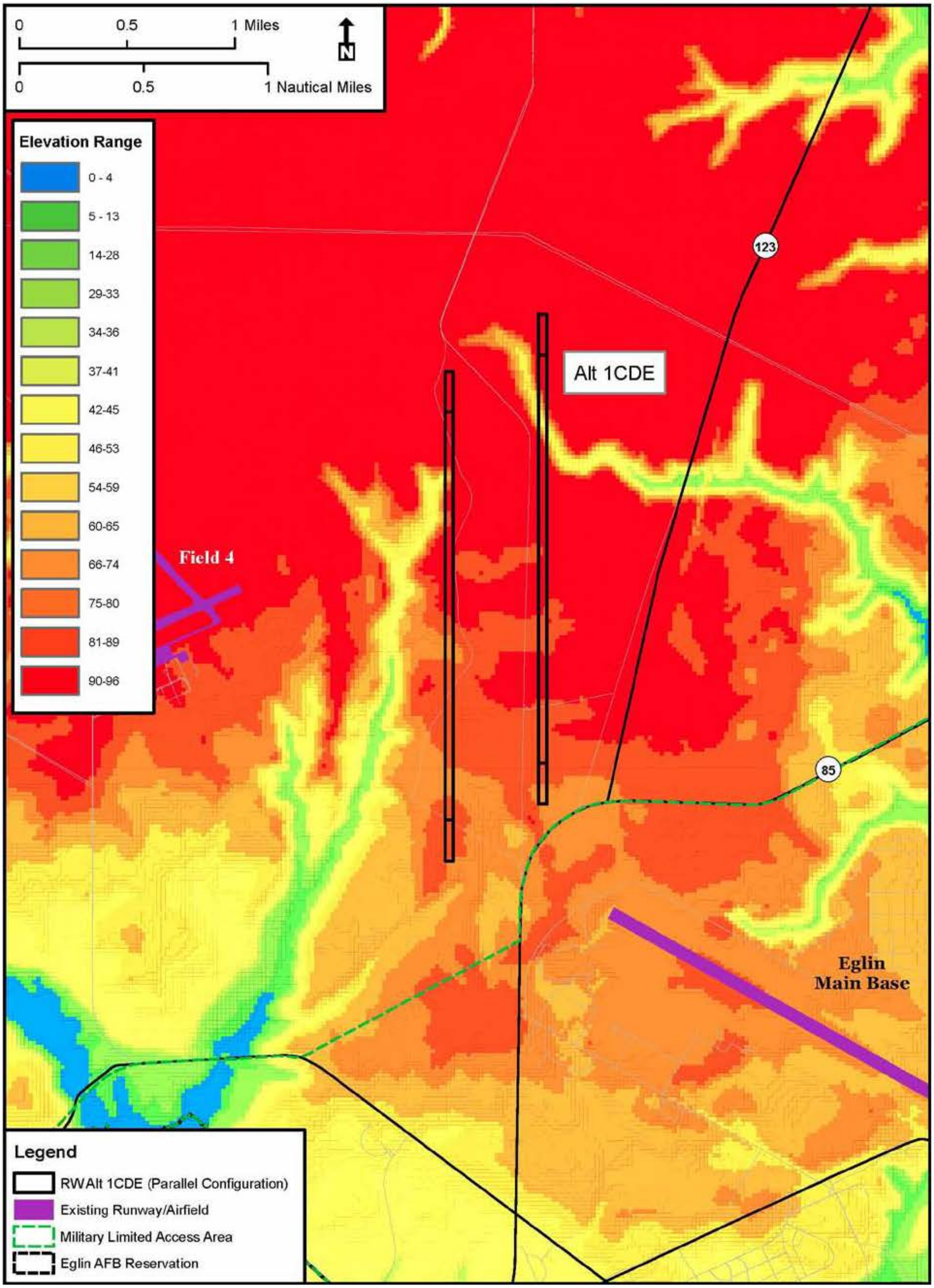


Figure 2-9. Alternatives 1C, 1D, and 1E Proposed Runway with Topography

Analysis of the Alternatives 1C, 1D, and 1E resulted in the new Alternative 1I. Alternative 1I proposes a new single additional runway instead of two parallel runways. The Alternative 1I runway would be oriented so that it would not place existing roads and facilities in the CZ, APZ I, or APZ II. Alternative 1I was carried forward for further analysis.

Alternative 1H (Move RW 19 South)

Alternative 1H would extend RW 19 2,000 feet to the south (Figure 2-10). The new landing approach would place the CZ over Jack's Lake, an existing water area with known bird and waterfowl populations, creating a major aircraft safety issue. Water areas that create bird/wildlife-aircraft strike hazards (BASHs) are prohibited in the CZ (AFH 32-7084). For this reason, Alternative 1H was eliminated from further consideration.

Application of Airfield Planning Criteria to Duke Field

After the application of the airfield planning criteria, the Air Force carried forward all candidate alternatives for Duke Field.

Application of Airfield Planning Criteria to Choctaw Field

After the application of the airfield planning criteria, the Air Force continued to consider Alternatives 3D and 3E, as well as modified versions of Alternatives 3A, 3B, and 3C, as discussed below.

While conducting airfield planning analysis on the original configuration of Alternatives 3A, 3B, and 3C that were presented at the scoping meetings, the Air Force discovered that site constraints affected the original configuration. The location of the additional runway was a problem because of the topography of the land in the area (Figure 2-11). Specifically, the site contains a 60-foot ridge. As a result of this problem, Air Force planning specialists considered other runway configurations. They determined that a "V" configuration, as shown in Figure 2-12 and Figure 2-13, presented the best solution to this problem. Alternatives 3A, 3B, and 3C were updated to reflect the "V" configuration.

Summary of Airfield Planning Analysis

The construction of new runways for certain alternatives would place existing facilities, roads, and wetlands in the CZ, APZ I, and APZ II of the new runways. The Air Force in most cases does not allow new construction in these zones unless they meet the land use recommendations found in AFH 32-7084. The Air Force decided it would not establish runways that would make existing facilities violate the land use recommendations in AFH 32-7084. Additionally, the Air Force eliminated alternatives that would result in relocation of substantial infrastructure.

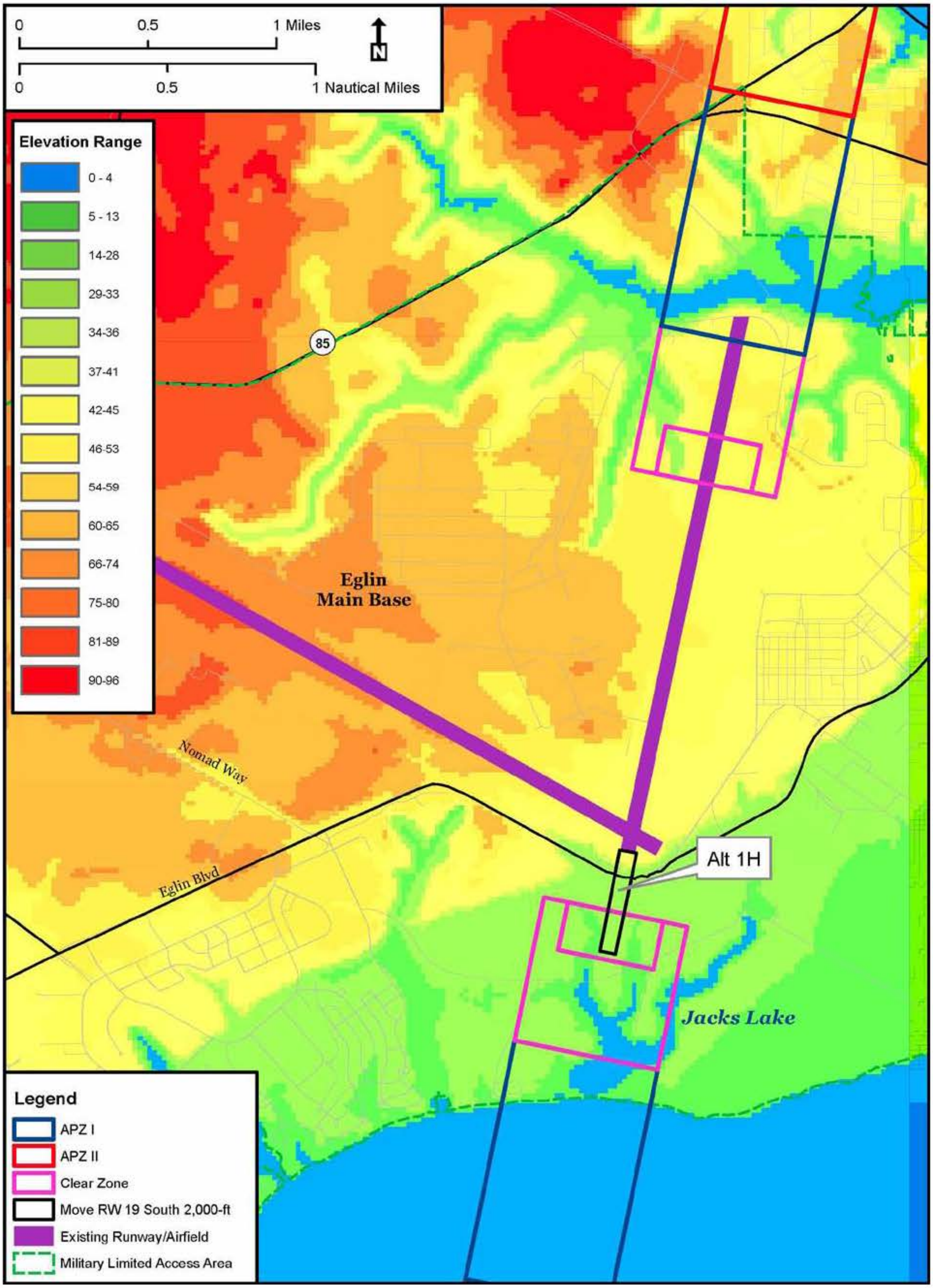


Figure 2-10. Alternative 1H – Runway 19 with Topography

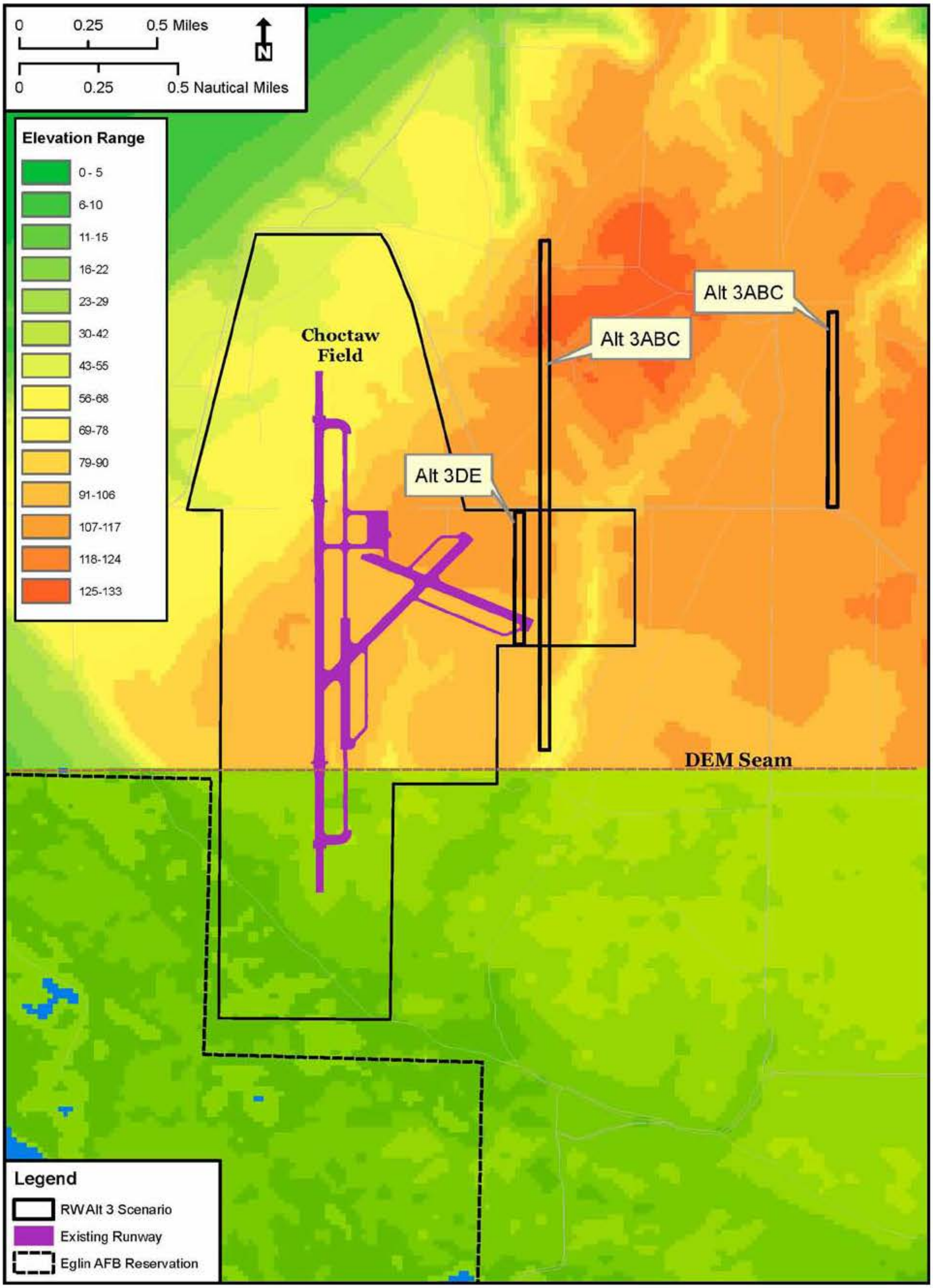


Figure 2-11. Alternatives 3A, 3B, and 3C – Initially Proposed Runway and Topography

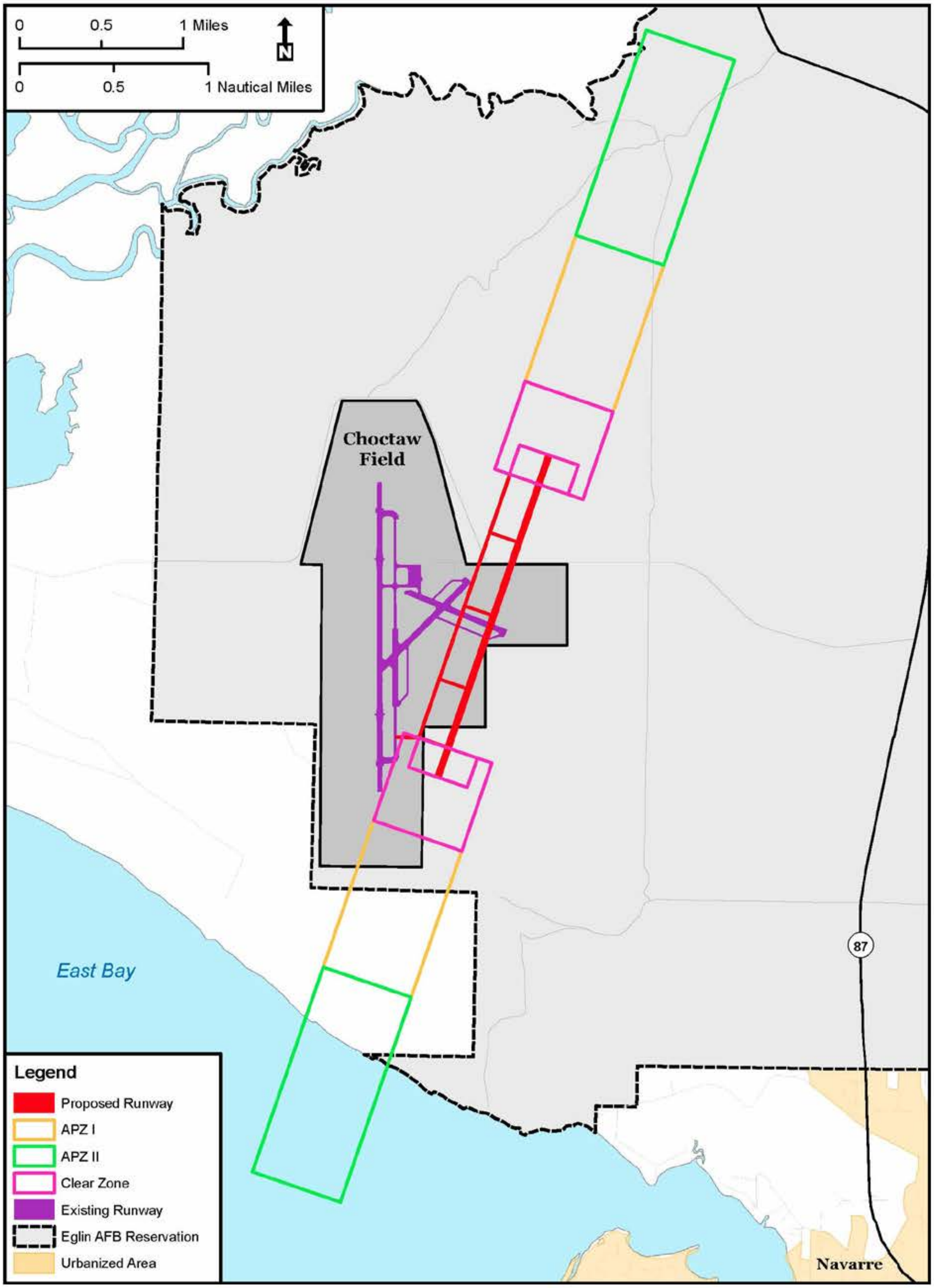


Figure 2-12. Alternatives 3A, 3B, and 3C – Choctaw Field Dual Runways, "V" Configuration

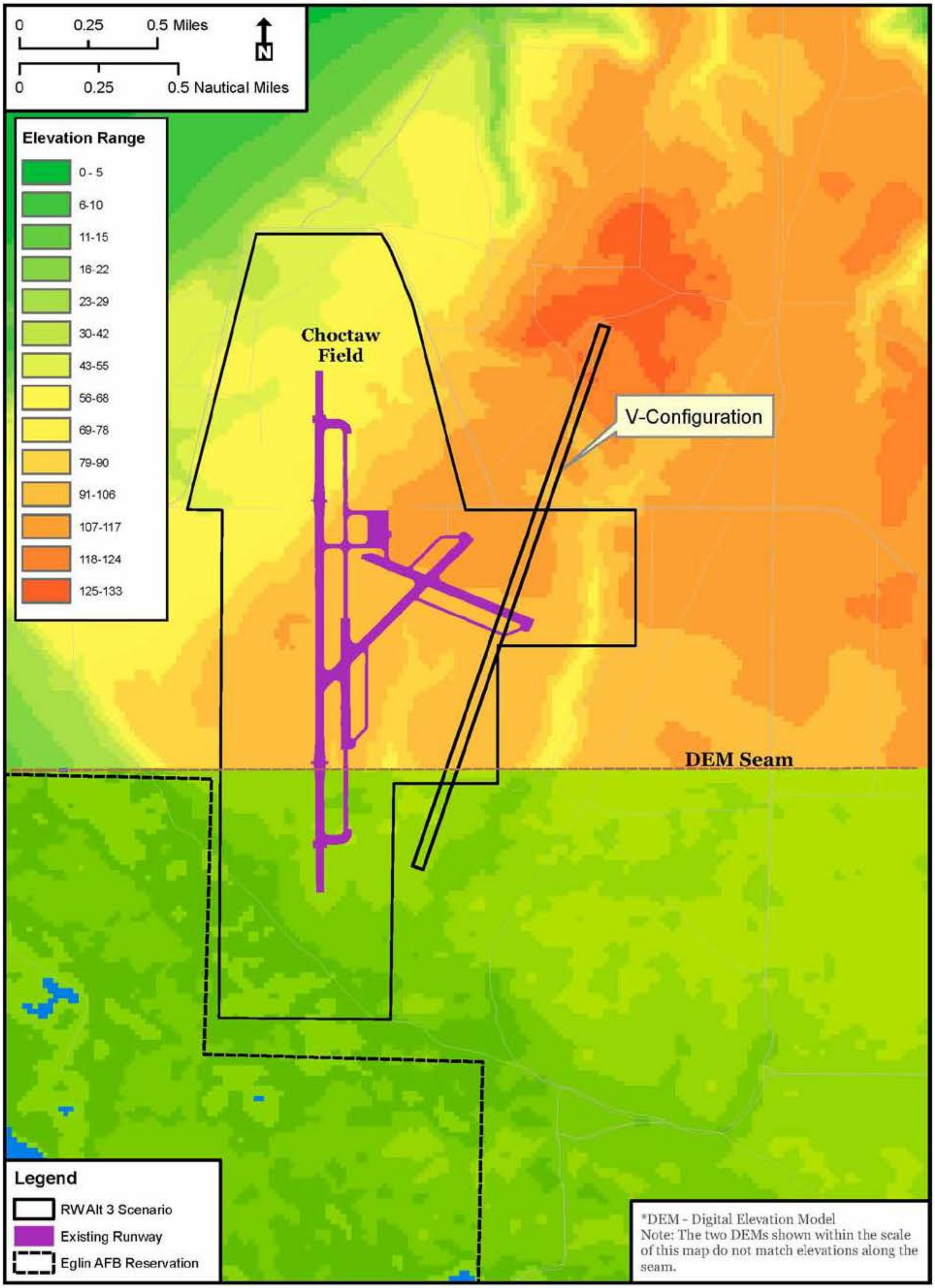


Figure 2-13. Alternatives 3A, 3B, and 3C – "V" Configuration Runway and Topography

Based on these criteria, Alternatives 1B, 1C, 1D, 1E, and 1H were eliminated because they would place existing features in the CZ, APZ I, and APZ II. Alternative 1B and 1H were eliminated also because they would require relocation of substantial infrastructure.

2.3.2.3.2 Additional Screening

The Air Force reapplied the operational feasibility, capacity, and range sustainment criteria to the alternatives after the airfield planning analysis. The reapplication of the criteria also considered additional information regarding Navy regional operations relevant to Choctaw Field as the MOB and its impacts to Navy training within the region.

Alternatives 1A, 1I, 2A, 2B, 2C, 2D, and 2E:

After the reapplication of the criteria, the Air Force carried forward Alternatives 1A, 1I, 2A, 2B, 2C, 2D, and 2E for detailed analysis.

Alternatives 3A, 3B, 3C, 3D, and 3E:

The central issue identified as a result of the reapplication of the criteria was air traffic congestion from simultaneous IFR operations being conducted at airfields within the vicinity of Choctaw Field. Air traffic congestion would be exacerbated by the JSF requirement for a precision approach, such as an Instrument Landing System (ILS) and/or precision approach radar, at the MOB. Placing the precision approach on the existing north/south runway under any of the Alternative 3 subalternatives would create unacceptable mission impacts due to airspace congestion. Placing the precision approach on the new proposed crossing runway (Alternatives 3A, 3B, and 3C) would create unacceptable mission impacts due to encroachment on the restricted airspace to the east of Choctaw Field.

The airspace in the vicinity of Choctaw Field supports military and civil operations at NOLF Santa Rosa, NAS Whiting Field, Pensacola Regional Airport, NAS Pensacola, Peter Prince Municipal Airport, and NOLF Holley. NOLF Santa Rosa and NAS Whiting Field conduct day/nighttime primary pilot training in support of more than 1.3 million annual flight operations. Whiting Field is located 12 miles north of Choctaw Field and is the busiest naval air station in the world, responsible for an estimated 46 percent of the Chief of Naval Air Training Command's total flight time. Peter Prince Municipal Airport, which is within 2 NM of the proposed final approach fix at Choctaw Field, supports approximately 300 general aviation flights a day. Additionally, air traffic patterns to Pensacola Regional Airport's global positioning system (GPS) approaches to Runway 26 pass over the top of Choctaw Field at 1,700 and 2,000 feet, respectively. The proximity of these airfields and the intensity of the number of supported operations curtails the potential expansion of Choctaw Field as a MOB.

The Navy's information indicated it is in the process of converting from T-34C training aircraft to T-6B training aircraft. The T-34C and T-6B have different operational requirements (i.e., the T-6B requires a longer runway). The T-34C could land at 14 OLFs near Whiting Field. The T-6B, however, can only land at three OLFs, one of which is Choctaw Field. This means that Navy operations at Choctaw Field are expected to increase substantially. The Navy's analysis showed that while most of their T-6B training operations would be able to successfully enter and utilize the three OLFs despite a heavy use rate, a small number of operations would be unable to complete their desired pattern operations. That analysis did not include the F-35.

The Navy indicated concern that the use of Choctaw Field by the F-35 would impact one of the only three remaining OLFs that the T-6B can use. The Navy indicated that it saw "a potential of mission failure due to projected delays in pattern work, pattern saturation, and most importantly incompatible type-aircraft mix (i.e., fleet versus primary flight training operations)." While these concerns applied to all F-35 alternatives utilizing Choctaw Field, the Navy indicated that using Choctaw Field as a MOB for the F-35 would create a significant impact on Navy training operations that use the T-6B.

Based on the airspace congestion in the vicinity of Choctaw Field, siting a precision approach on the existing north/south runway would create unacceptable mission impacts. Introducing JSF main base operations would degrade all aircraft operations at Choctaw Field and within its vicinity, such as instrument procedures and Federal Aviation Administration (FAA)- or Navy-controlled IFR operations at NAS Whiting Field, Pensacola Regional Airport, NAS Pensacola, and Peter Prince Municipal Airport.

The instrument approach would also be partially located in an Alert Area A-292, which is identified on aeronautical charts to alert pilots that intensive volumes of student training are taking place. In addition, the final approach fix for an ILS to the existing runway would be within 2 NM of both civil and military airfields, which would result in a large volume of military student training in close proximity to routine civil aircraft operations. When weather conditions require flight operations under IFR, significant reductions in the number of aircraft that could safely and effectively use the airspace would occur due to the requirement to maintain IFR aircraft separation standards. An additional complication would be the mixing of high performance F-35 aircraft with Navy or civil aircraft, which operate at significantly slower speeds.

Taken as a whole, and acknowledging the varying proficiency of students (both F-35 and T-6 trainees) as they progress through their training, the selection of Choctaw Field as an alternative for the MOB introduces unacceptable operational risk considerations. Due to these concerns, the Air Force determined that an instrument approach could not be placed on the existing north/south runway for any of the Alternative 3 subalternatives. This eliminated Alternatives 3D and 3E as options for the MOB because they would use only the existing north/south runway. Although the north/south runway under Alternatives 3A, 3B, and 3C could not be used for the precision approach, the Air Force considered installing the precision approach on the new crossing runway. However, siting the precision approach on the new crossing runway would result in aircraft flying the instrument approach procedure through Restricted Airspace 2915-A, a significant portion of Eglin AFB's overland restricted airspace (described in Section 2.6.4 of the FEIS), which is located immediately east of Choctaw Field. Due to the approach procedure penetrating the restricted airspace, other test and training missions would routinely restrict aircraft from accomplishing their instrument approaches, or vice versa. Because this interference would cause unavoidable mission impacts, the Air Force eliminated Alternatives 3A, 3B, and 3C as options for the MOB.

2.3.2.4 *Summary of Alternatives Considered but Eliminated From Detailed Analysis*

Based on the information presented in Section 2.3.2 above, Alternatives 1B, 1C, 1D, 1E, and 1H were eliminated because they would violate land use guidelines for CZ, APZ I, and APZ II. Alternatives 1B and 1H were eliminated also because they would require relocation of substantial infrastructure. Alternatives 3A, 3B, 3C, 3D, and 3E were eliminated because they did not meet capacity and range sustainment requirements. The remaining alternatives were carried forward for detailed analysis (Note: Alternatives 1F and 1G have been carried forward as mitigations). Although Choctaw Field has been eliminated from further analysis as a beddown location, it will still be analyzed for use as an auxiliary field under some of the alternatives being carried forward for detailed analysis.

Table 2-8 lists the alternatives that were considered but are not being carried forward for detailed analysis.

Table 2-8. Summary of Candidate Alternatives Eliminated from Detailed Analysis

Alternative	Description	Reason Eliminated
1B	Eglin Main Base – Adjust Runway 19 to 16; Duke and Choctaw auxiliary fields	Airfield planning constraints
1C	Eglin Main Base – Expansion with parallel runways; Duke auxiliary field	Airfield planning constraints
1D	Eglin Main Base – Expansion with parallel runways; Choctaw auxiliary field	Airfield planning constraints
1E	Eglin Main Base – Expansion with parallel runway; Duke and Choctaw auxiliary fields	Airfield planning constraints
1F	Eglin Main Base – Move Runway 19 threshold; Duke and Choctaw auxiliary fields	Carried forward as a mitigation
1G	Eglin Main Base – Raise the Runway 19 IAP; Duke and Choctaw auxiliary fields	Carried forward as a mitigation
1H	Eglin Main Base – Move Runway 19 south; Duke and Choctaw auxiliary fields	Airfield planning constraints
3A	Choctaw Field – Parallel Runways and LHA; Duke auxiliary field	Additional screening: operational feasibility, capacity, and range sustainment
3B	Choctaw Field – Parallel Runways and LHA; Eglin 12 auxiliary field	Additional screening: operational feasibility, capacity, and range sustainment

Table 2-8. Summary of Candidate Alternatives Eliminated from Detailed Analysis, Cont'd

Alternative	Description	Reason Eliminated
3C	Choctaw Field – Parallel Runways and LHA; Eglin 12 and Duke auxiliary fields	Additional screening: operational feasibility, capacity, and range sustainment
3D	Choctaw Field – Single Runway and LHA; Eglin 12 and Duke auxiliary fields	Additional screening: operational feasibility
3E	Choctaw Field – Single Runway and LHA; Duke auxiliary fields	Additional screening: operational feasibility

IAP = Initial Approach Pattern; LHA = Landing Helicopter Amphibious

2.3.3 Alternatives Carried Forward for JSF Beddown

Based on the three-phase alternative screening process detailed in Sections 2.3.1 and 2.3.2, it was determined that two primary, or "anchor," locations could support the MOB airfield requirements. These include Eglin Main Base and Duke Field. Each of these anchor locations involved varying alternative options for runway configuration and possible construction. Using these anchor alternatives, a 50-NM radius was mapped and each field within that radius was compared with the established screening criteria for auxiliary fields. The resultant potential auxiliary fields would receive the majority of JSF operational flight training; however, various fields in the surrounding area may be used, but those training levels would be at transient levels.

The following auxiliary fields met all of the screening criteria: Choctaw Field, Duke Field, and Eglin Main RW 12. These auxiliary fields would receive the majority of JSF operational flight training; however, Tyndall AFB and NAS Pensacola will be used as PIAFs. Other JSF-compatible airfields within the surrounding area may be used on an infrequent basis.

Table 2-9 lists the alternatives that are carried forward for detailed analysis. The two anchor alternatives are henceforth known as Alternative 1, Eglin Main Base Alternative, and Alternative 2, Duke Field Alternative.

Table 2-9. Alternatives Carried Forward for Detailed Analysis

Alternative	Description
Alternative 1: Eglin Main Base Alternatives	
1A	No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field
1I*	One New Runway at Eglin Plus Use of Duke Field and Choctaw Field
Alternative 2: Duke Field Alternatives	
2A	Duke Field Parallel Runways and LHA Plus Choctaw Field
2B	Duke Field Parallel Runways and LHA Plus Eglin RW 12
2C	Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field
2D	Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field
2E	Duke Field Single Runway Plus Choctaw Field

LHA = Landing Helicopter Amphibious; RW = Runway
*Alternatives 1B, 1C, 1D, 1E, 1F, 1G, and 1H were presented at the public scoping meeting, but were eliminated as alternatives carried forward for detailed analysis as described in Section 2.3.2. One new alternative was developed after the scoping meetings and assigned the next sequential alphabetical identifier: 1I.

2.3.4 Alternative 1: Eglin Main Base Alternative

Eglin Main Base land use includes airfield and aircraft operations and maintenance (approximately 2,362 acres), industrial land use in nine separate areas (2,057 acres), open space (4,141 acres), and residential areas (over 1,000 acres). Figure 2-14 provides an aerial view of Eglin Main Base. The airfield configuration includes two major runways: Northwest-Southeast (NW-SE) RW 12/30 (12,000 feet by 300 feet) and North-South (N-S) RW 01/19 (10,000 feet by 300 feet). RW 19 and RW 30 contain precision approach systems that provide guidance to aircraft approaching and landing on a runway, using a combination of radio signals and/or lighting arrays to enable a safe landing during adverse weather conditions. In addition, the airfield contains over 100 designated military aircraft parking spaces.

Common Elements Among Alternatives

For Alternative 1, there are certain common elements among all its subalternative options. The MOB would be Eglin Main Base, while any combination of Duke Field and Choctaw Field could be used for auxiliary fields. Environmental effects of operations associated with the 59 F-35 aircraft at each airfield are analyzed for each alternative. In addition, as described in Section 2.3.1.2, *Auxiliary Airfields,* JSF IJTS F-35 aircraft would utilize the runways at NAS Pensacola and Tyndall AFB for practice approaches under *all* of the action alternatives. JSF IJTS F-35 operations projected for NAS Pensacola are consistent with levels described in the FEIS. In contrast, the JSF IJTS F-35 operations projected for Tyndall AFB would represent an increase in operations over what was identified in the FEIS, as a result of the GRASI recommendations to relocate simulated flameout operations (described in Section 1.2.6). The action alternatives would include 1,947 and 6,862 annual operations at NAS Pensacola and Tyndall AFB, respectively.

As stated in Section 1.2.6, seven GRASI recommendations were incorporated in the Alternative analyses to ensure that the proposed action of JSF IJTS could be implemented. One of those recommendations was the creation of four Air Traffic Control assigned airspaces (ATCAAs). The creation of the four ATCAAs will occur under a memorandum of understanding and will not require formal FAA rulemaking. Since the ATCAAs will be established at altitudes greater than 24,000 feet AGL, airspace is the only affected resource.

Another GRASI recommendation that is common across all action alternatives is the utilization of additional non-Eglin airspace to expand training opportunities. The additional special use airspace (SUA) units evaluated include Camden Ridge/Pine Hill, Carabelle East/West, Compass Lake, Desoto/R-4401, W-155, and Moody AFB (Table 1-2).

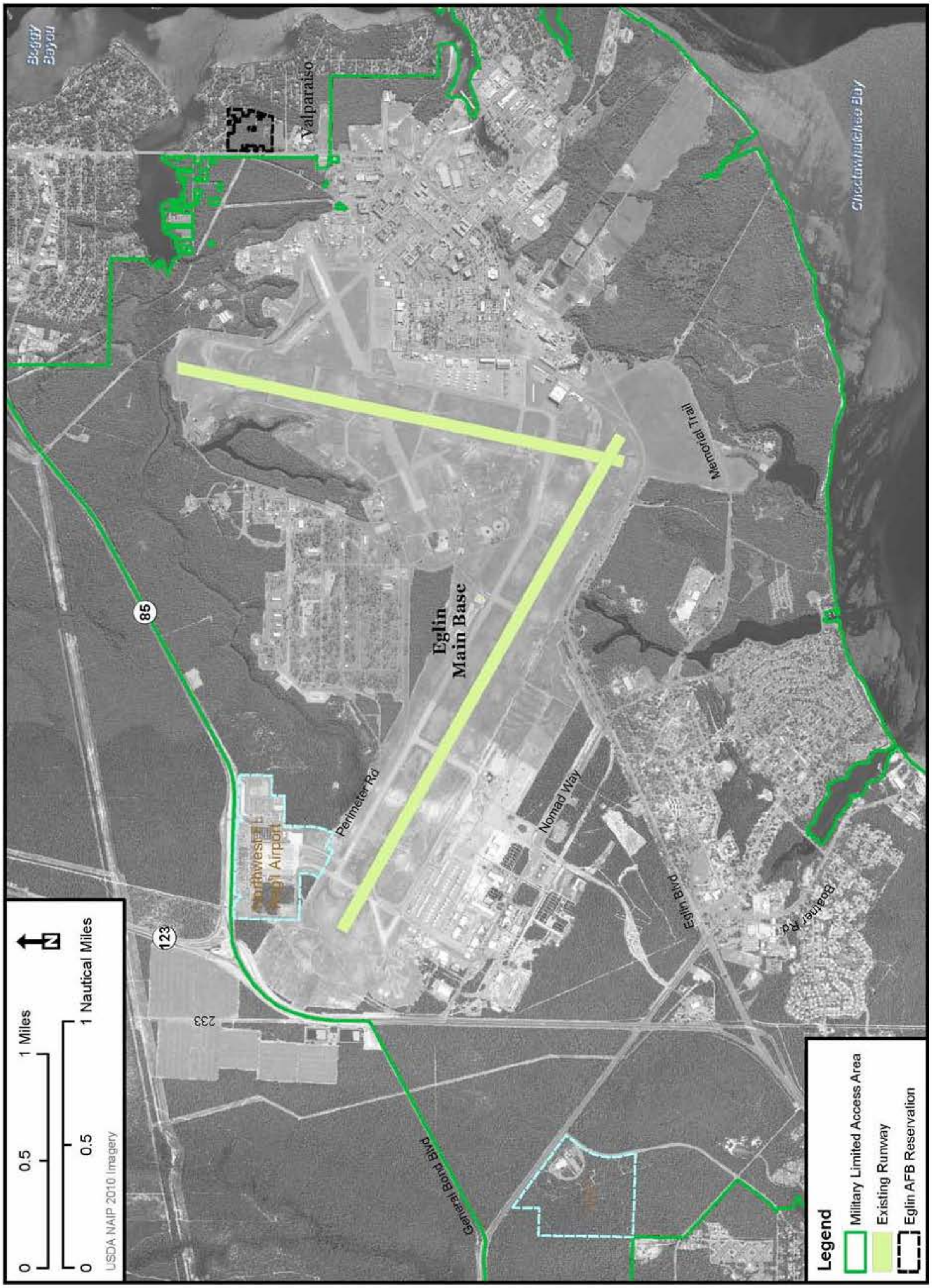


Figure 2-14. Aerial View of Eglin Main Base and Existing Runway – Alternative 1A (Preferred Alternative)

All proposed facilities associated with Alternative 1 and associated subalternative options (including the Landing Helicopter Amphibious [LHA] deck at Duke Field but not the new runway that is being proposed under Alternative 1I), were previously analyzed in the FEIS and will not be analyzed specifically in this SEIS but will be incorporated by reference where appropriate. Table 2-10 illustrates the annual Air Traffic Control operations associated with Alternative 1. All alternatives would not have flight restrictions on RW 01/19. Nonetheless, all alternatives were designed, to the maximum extent practical, to minimize or avoid altogether the routine use of RW 01/19 for F-35 operations to avoid or reduce noise impacts. Appendix E, *Noise*, details the number of flights that would occur on RW 01/19 for each alternative.

2.3.4.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Alternative 1A would eliminate RW 01/19 flight limitations identified in the February 2009 ROD; that is, the runway would be allowed to be used for F-35 training activities instead of just landings/takeoffs and emergency use. Duke Field and Choctaw Field would be used as auxiliary fields to support flight training activities. The Air Force has identified Alternative 1A as the preferred alternative for this SEIS. Construction activities would be similar to those indicated in the FEIS.

Table 2-10. Annual Air Traffic Control Operations Associated With Alternative 1

Aircraft Type	Eglin	Duke	Choctaw
F-35	43,071	18,650	20,263
Other*	99,289	22,403	75,831
Total	142,360	41,053	96,094

Source: AETC/A5RZ, 2012
* Note: "Other" aircraft includes non-IJTS aircraft operating at Eglin AFB.

2.3.4.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Under Alternative 1I, one new runway with a minimum length and width of 8,000 by 150 feet would be constructed to the northwest of RW 12/30 on Eglin Main Base as shown in Figure 2-15 and Figure 2-16. The total acreage to be cleared for construction would be 2,127 acres. This option would include a taxiway across Hwy 85 to Eglin Main Base. Live munitions would need to be transported by wheeled vehicles to a new live ordnance loading area(s) located near the new runway area. A new precision instrument approach would be installed on the new runway. Choctaw Field and Duke Field would supplement activities on these new runways and be used as auxiliary fields. Construction activities would be the same as Alternative 1A with the exception of the following proposed facilities, all of which are associated with the construction of the new runway, which is an increase of approximately 5 million ft^2 over Alternative 1A: a new runway and taxiway, an additional control tower, a new fire and emergency services facility, end-of-runway shacks, and aircraft barriers (BAK-14).

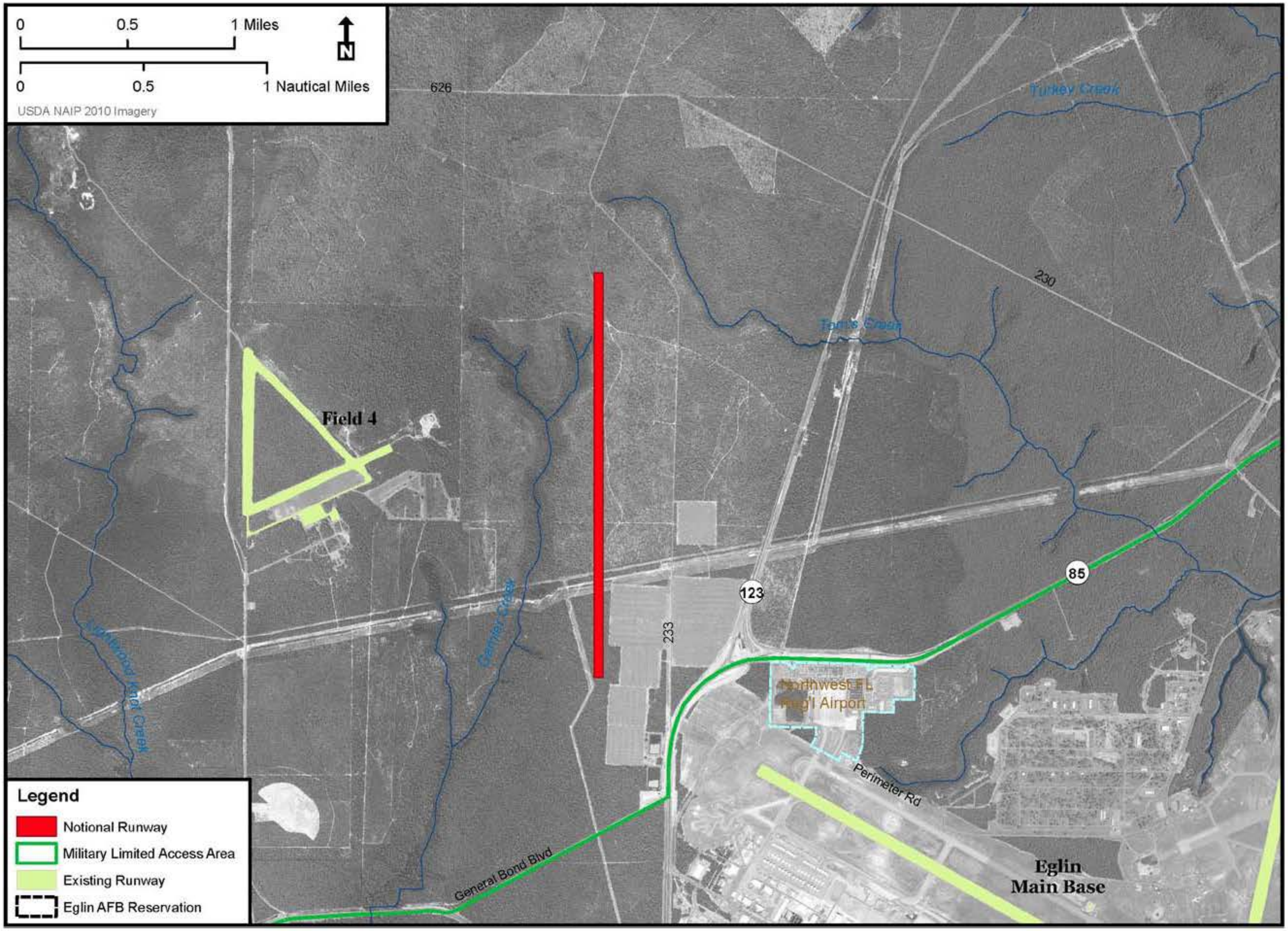


Figure 2-15. Notional Location of Alternative 1I Runway Construction

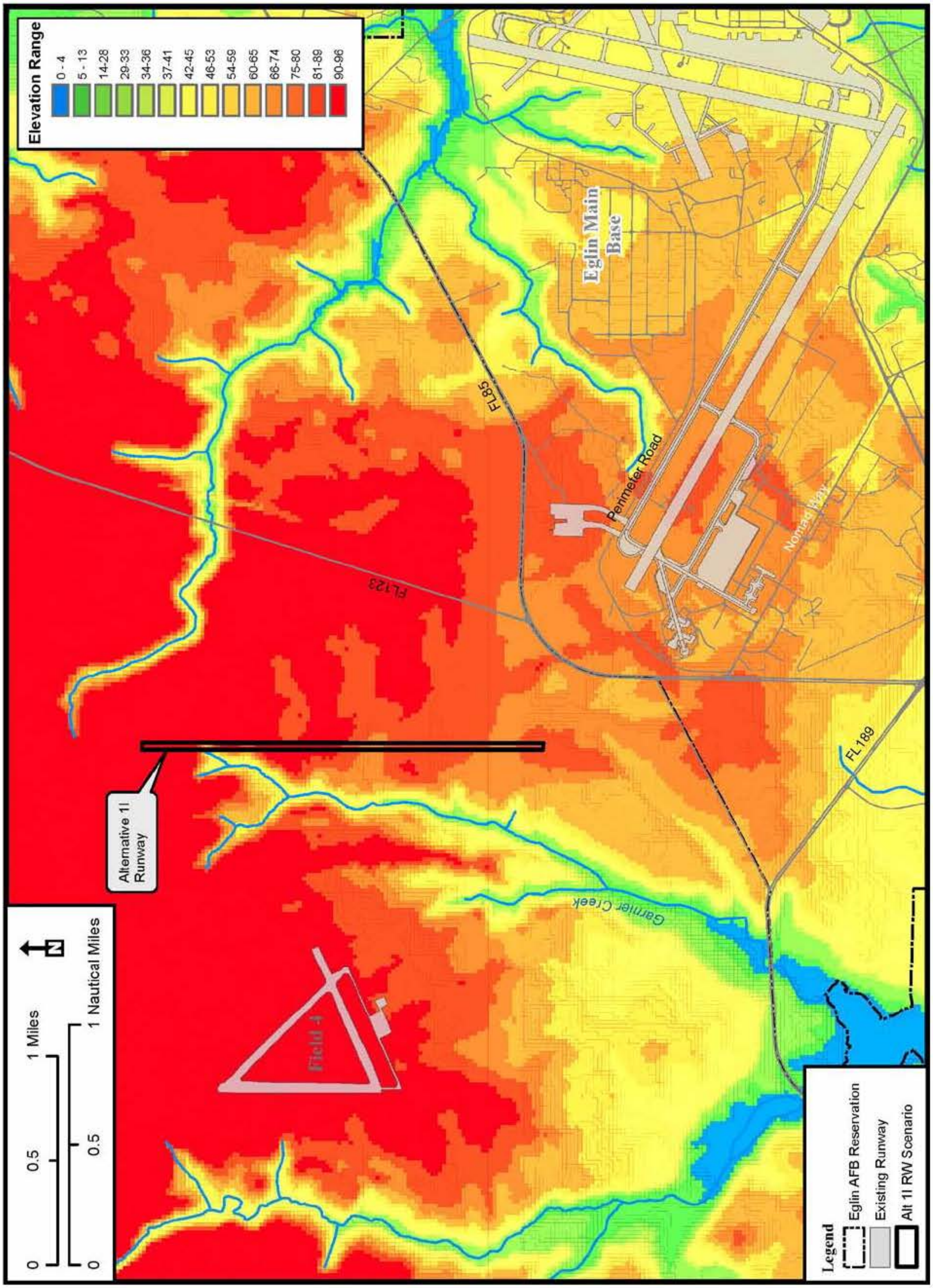


Figure 2-16. Alternative 1I – Proposed Runway with Topography

2.3.5 Alternative 2: Duke Field Alternative

Common Elements Among Alternatives

The MOB for the beddown would be at Duke Field, while any combination of Eglin Main RW 12 and Choctaw Field would be used for auxiliary fields. No alternative would have flight restrictions on RW 01/19. Appendix E details the number of flights that would occur on RW 01/19 for each alternative. Environmental effects of 59 F-35 aircraft operations at each airfield are analyzed for all alternatives.

As with Alternative 1, JSF IJTS F-35 aircraft would utilize the runways at NAS Pensacola and Tyndall AFB for practice approaches under *all* of the action alternatives. The operational levels projected for NAS Pensacola and Tyndall AFB are the same as described for Alternative 1 in Section 2.3.4. In addition, the SUA and ATCAA under Alternative 2 will be utilized as described for Alternative 1 in Section 2.3.4.

A fuel line from Eglin Main Base would be constructed to provide the appropriate volume of JP-8 (jet fuel) to support training activities. It is anticipated that this fuel line would be built within current utility easements or rights-of-way and would parallel Hwy 85 and Hwy 123.

New facilities proposed for construction at Duke Field under Alternative 2 are similar among the subalternatives, except for the new runway–related facilities under Alternatives 2A, 2B, and 2C. Total construction under Alternative 2A, 2B, or 2C would be approximately 10,270,995 square feet (to include the new runway, taxiway, emergency services facility, etc.) and 4,983,805 square feet under Alternative 2D or 2E.

All support facilities for the IJTS such as dormitories, academic training, and flight simulators as outlined in the FEIS would be located at Eglin Main Base as previously approved in the February 2009 ROD and are not subject to analysis in this SEIS. Those facilities would not be constructed at Duke Field.

2.3.5.1 *Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field*

Under this alternative, parallel runways would be created by the construction of one new runway to the east of Duke Field's current Area of Operations. The new runway would have a minimum length and width of 8,000 by 150 feet. In addition to the new runway construction, an LHA strip and separate vertical landing pads would be constructed. The total acreage to be cleared for the construction would be 3,078 acres.

Figure 2-17 provides a notional location of the planned runway and LHA construction. A precision instrument approach would be installed on the new runway construction to de-conflict current instrument approach issues with Bob Sikes Airport. Choctaw Field would be the main auxiliary field, and other fields may supplement flight operations at the transient levels of less than five operations per day on average.

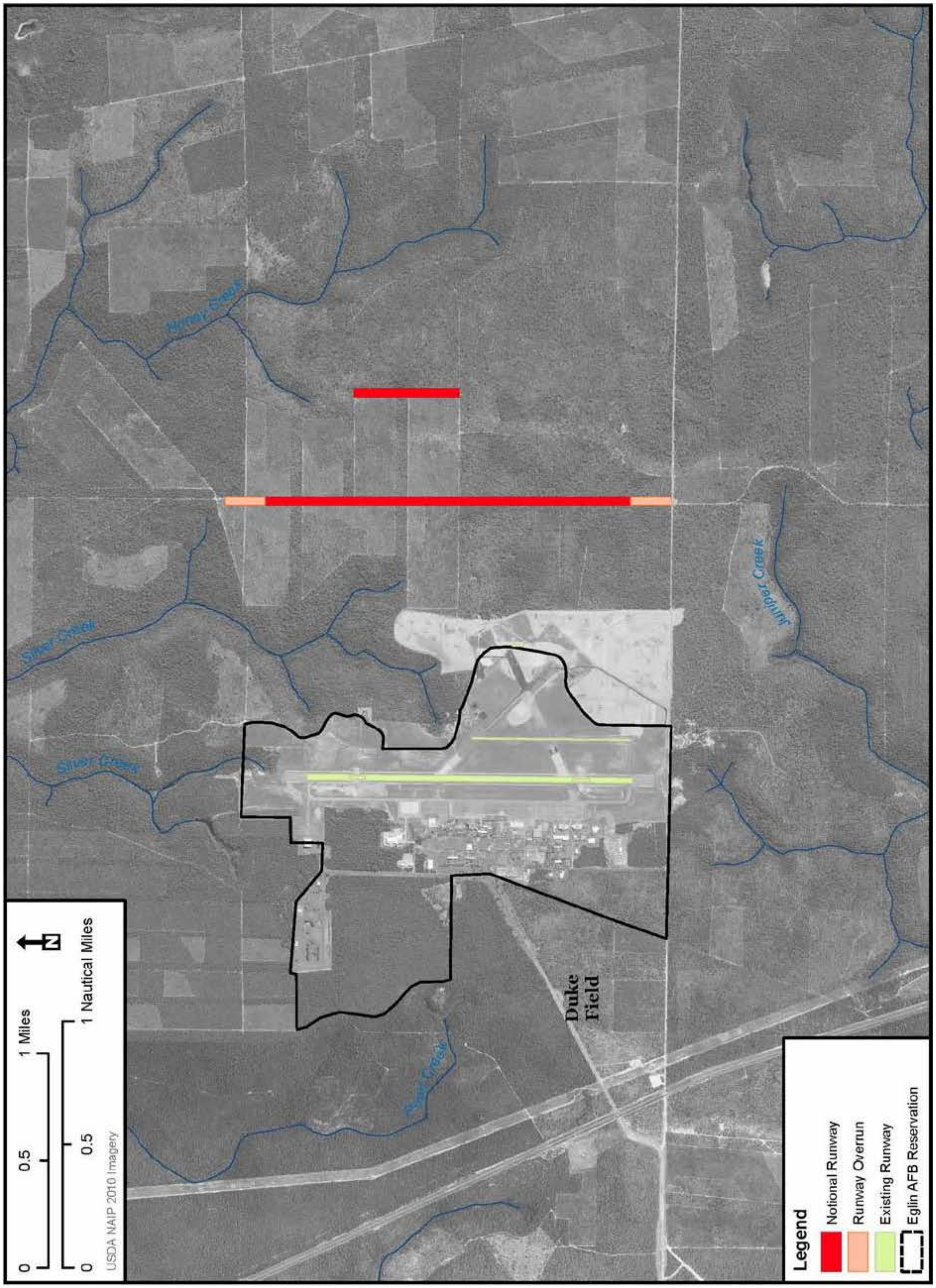


Figure 2-17. Notional Location of Alternatives 2A, 2B, and 2C Runway and LHA Construction

Table 2-11 illustrates the proposed annual Air Traffic Control operations associated with Alternative 2A for each potential level of squadrons.

Table 2-11. Annual Air Traffic Control Operations Associated With Alternative 2A

Aircraft Type	Eglin	Duke	Choctaw
F-35	0	54,383	27,403
Other*	99,289	22,403	75,831
Total	**99,289**	**76,786**	**103,234**

Source: AETC/A5RZ, 2012
*Note: "Other" aircraft includes non-IJTS aircraft operating at Eglin AFB.

2.3.5.2 *Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12*

This option would be located in the same notional area (Figure 2-17) and include the same construction activities described in Alternative 2A; however, flight operations would be supplemented by the use of Eglin Main RW 12. Table 2-12 illustrates the annual Air Traffic Control operations associated with Alternative 2B for each potential level of squadrons.

Table 2-12. Annual Air Traffic Control Operations Associated With Alternative 2B

Aircraft Type	Eglin	Duke	Choctaw
F-35	14,962	66,725	0
Other*	99,289	22,403	75,831
Total	**114,251**	**89,128**	**75,831**

Source: AETC/A5RZ, 2012
*Note: "Other" aircraft includes non-IJTS aircraft operating at Eglin AFB.

2.3.5.3 *Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field*

Under this option, the notional location and construction activities would be the same as Alternative 2A (Figure 2-17); however, flight operations would be supplemented by Eglin Main RW 12 and Choctaw Field. Table 2-13 illustrates the annual Air Traffic Control operations associated with Alternative 2C for each potential level of squadrons.

Table 2-13. Annual Air Traffic Control Operations Associated With Alternative 2C

Aircraft Type	Eglin	Duke	Choctaw
F-35	13,126	49,462	19,636
Other*	99,289	22,403	75,831
Total	**112,415**	**71,865**	**95,467**

Source: AETC/A5RZ, 2012
*Note: "Other" aircraft includes non-IJTS aircraft operating at Eglin AFB.

2.3.5.4 *Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field*

Under this alternative the current runway would be utilized. Precision instrument approach training would occur at Duke RW 18, while Choctaw Field and Eglin Main RW 12 would supplement flight operations. Table 2-14 illustrates the annual Air Traffic Control operations associated with Alternative 2D for each potential level of squadrons.

Table 2-14. Annual Air Traffic Control Operations Associated With Alternative 2D

Aircraft Type	Eglin	Duke	Choctaw
F-35	13,912	47,296	21,312
Other*	99,289	22,403	75,831
Total	**113,201**	**69,699**	**97,143**

Source: AETC/A5RZ, 2012

*Note: "Other" aircraft includes non-IJTS aircraft operating at Eglin AFB.

2.3.5.5 *Alternative 2E – Duke Field Single Runway Plus Choctaw Field*

Under this alternative, the current runway would be utilized. Precision instrument approach training would occur on Duke RW 18, while Choctaw Field would supplement flight operations. However, various fields in the surrounding area may be used as PIAFs or relieve potential congestion but those operational activities will be at transient levels. Table 2-15 illustrates the annual Air Traffic Control operations associated with Alternative 2E for each potential level of squadrons.

Table 2-15. Annual Air Traffic Control Operations Associated With Alternative 2E

Aircraft Type	Eglin	Duke	Choctaw
F-35	0	53,905	26,793
Other*	99,289	22,403	75,831
Total	**99,289**	**76,308**	**102,624**

Source: AETC/A5RZ, 2012

*Note: "Other" aircraft includes non-IJTS aircraft operating at Eglin AFB.

2.4 REGULATORY COMPLIANCE

This SEIS has been prepared to satisfy the requirements of NEPA (42 United States Code 4321 et seq.) and its implementing regulations. This analysis of environmental resources considered all applicable federal, state, and local regulations.

Compliance with the Endangered Species Act (ESA) involves consultation with the Department of the Interior (delegated to the U.S. Fish and Wildlife Service [USFWS]) in cases where a federal action could affect listed threatened or endangered species, species proposed for listing, or candidates for listing.

The preservation of cultural resources associated with this SEIS primarily relates to meeting provisions of the National Historic Preservation Act (NHPA), as amended, and Section 106 of the act. Consultation with the State Historic Preservation Officer (SHPO), federally recognized tribes, and other parties including public participation, was part of the Section 106 planning process incorporated with the development of this SEIS. Eglin AFB consulted the Alabama SHPO, the Florida SHPO and four federally recognized tribes: the Miccosukee Tribe of Indians of Florida, the Seminole Tribe of Florida, the Poarch Band of Creek Indians, Alabama, and the Muskogee (Creek) Nation of Oklahoma. After completion of the FEIS and prior to initiation of the SEIS, the Thlopthlocco Tribal Town of the Creek (Muskogee) expressed interest in consulting with Eglin AFB and has been added as a consulting tribe for the SEIS.

A project-specific programmatic agreement was developed as part of the FEIS's Section 106 consultation effort, and an existing separate 2003 programmatic agreement for historic structures is pertinent to aspects of the FEIS. In addition, an amended project-specific programmatic agreement based on the SEIS was developed and is provided in Appendix F, *Cultural Resources*. The appendix discusses how NHPA compliance was met for all alternatives in this SEIS.

2.4.1 Other Regulations and Permit Requirements

This SEIS has been prepared in compliance with NEPA; other federal statutes, such as the Clean Air Act and the Clean Water Act (CWA); Executive Orders; and applicable state statutes and regulations. A list of Eglin AFB permits and certifications was compiled and reviewed during the EIS process. Table 2-16 summarizes these applicable federal, state, and local permits/regulations and the potential for change to the permits due to implementing the proposed beddown or an alternative.

Table 2-16. Applicable Permits/Regulations and Potential Permit Changes Due to BRAC Decisions

Resource Area	Permits/Regulations	Proposed Action
Airspace	No Permits Required	Not Applicable
Noise	No Permits Required	Not Applicable
Socioeconomics	No Permits Required	Not Applicable
Transportation	No Permits Required	Not Applicable
Utilities	New Consumptive Use Permit and a Potable Water System permit	If consumptive use is to exceed currently permitted levels or new potable water system is required to support the beddown, the Consumptive Use Permit may require revision or a new Potable Water System permit may be required.
Air Quality	Federal Clean Air Act, Title V Air Operation Permit and Air Construction Permit	Construction of new fuel storage tanks or distribution facilities may require an Air Construction Permit and revision of the existing Air Operation Permit (0910031-013-AV).
Safety	No Permits Required	Not Applicable
Solid Waste	No Permits Required	Not Applicable
Hazardous Materials	No Permits Required	Not Applicable
Physical Resources	Construction activities would also require coverage under the Generic Permit for Stormwater Discharge from Large and Small Construction Activities, where 1 or more acres of land are disturbed (Clean Water Act [CWA]; Florida Administrative Code [FAC] Rule 62 621).	All construction activities that have the potential to impact stormwater quality or disturb more than 1 acre of land must be permitted under CWA National Pollutant Discharge Elimination System (NPDES) regulation as administered by the Florida Department of Environmental Protection (FDEP). The Air Force would incorporate a comprehensive Stormwater, Erosion and Sedimentation Control Plan and a Storm Water Pollution Prevention Plan into the final design plan.
	Stormwater Discharge Permits FAC Rule 62-346	Stormwater Discharge Permits and any necessary utility extension permits would require coordination between the proponent and Eglin's Natural Resources Section (NRS). The Air Force would obtain all appropriate permits prior to the commencement of any ground-disturbing activities.
		An Application for Stormwater Permit in Northwest Florida will be submitted by the Air Force prior to project initiation according to FAC Rule 62-346.
	Coastal Zone Management Act (CZMA) Consistency Determination	Actions taking place within the jurisdictional concerns of the FDEP require a consistency determination with respect to Florida's Coastal Zone Management Plan and the CZMA. The CZMA Determination for the FEIS will be incorporated by reference and is included in the Appendices.

Table 2-16. Applicable Permits/Regulations and Potential Permit Changes due to BRAC Decisions, Cont'd

Resource Area	Permits/Regulations	Proposed Action
Physical Resources, cont'd	Per Executive Order (EO) 11988, *Floodplain Management*, and EO 11990, *Protection of Wetlands*, the Air Force is required to consider their actions in wetlands or floodplains.	The proponent and its contractor shall coordinate with Eglin's NRS for the following: ● Final stormwater design and permitting. ● Any potential discharges into surface waters from construction activities. ● Final backflow preventer design, if applicable.
	Design and Construction Permit	Any proposed stormwater retention or design features associated with runway or other construction would require an "Application for Stormwater Permit in Northwest Florida" to be submitted by the Air Force prior to project initiation according to FAC Rule 62-346 (new permit process promulgated on October 1, 2007).
Biological Resources	Endangered Species Act (ESA) Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS) will occur regarding all proposed activities.	ESA Section 7 Consultation with the USFWS was conducted for the preferred alternative in the FEIS and is incorporated by reference, and the USFWS Biological Opinion is included in Appendix H, *Biological Resources*.
Cultural Resources	No Permits Required. Section 106 consultation with the State Historic Preservation Officer (SHPO) and Tribes will occur as needed.	Section 106 consultation with the SHPO and Tribes was conducted. The resulting amendment to the Programmatic Agreement developed under the FEIS is included in Appendix F, *Cultural Resources*.

2.5 ENVIRONMENTAL COMPARISON OF ALTERNATIVES

Table 2-17 provides a summary of the environmental consequences of the JSF beddown construction activities, grouped by resource area, associated with each alternative. It also shows the No Action condition for each resource. Table 2-18 provides a similar summary for JSF flight training activities.

Table 2-17. Potential Impacts from the Implementation of the JSF Beddown Construction and Ground Operation Activities

Alternative	Potential Impacts
Airspace (Section 4.2)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	There are no impacts to airspace from construction activities.
Noise (Section 4.3)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	Construction noise under any of the alternatives would be temporary and impacts would be limited to minor annoyance. Construction noise would be more widespread and of longer duration under Alternatives 1I, 2A, 2B, 2C, 2D, and 2E than under Alternative 1A due to additional large-scale construction projects.
Land Use (Section 4.4)	
No Action **1A**	Construction related land use impacts associated with the No Action Alternative were previously analyzed in the Final Environment Impact Statement (FEIS), and all construction was authorized by the February 2009 Record of Decision (ROD).
1I	New runway construction adjacent to Eglin Main Base under Alternative 1I would eliminate public access and outdoor recreation including hunting in the affected area (206 acres in Management Unit (MU) 5 and 1,547 acres in MU 6A).
2A **2B** **2C** **2D** **2E**	Construction of additional Joint Strike Fighter (JSF) facilities at Duke Field under all Alternative 2 alternatives would remove 226 acres within MU 9A. Construction of the new runway and Landing Helicopter Amphibious (LHA) deck at Duke Field under Alternatives 2A, 2B, and 2C would remove 164 acres in MU 7, 265 acres in MU 7A, 1,092 acres in MU 9, and an additional 1,556 acres in MU 9A from public access and outdoor recreation. An existing game check station would also need to be relocated. Existing land use at the auxiliary (outlying) fields would not be affected under any of the alternatives.

Table 2-17. Potential Impacts from the Implementation of the JSF Beddown Construction and Ground Operation Activities, Cont'd

Alternative	Potential Impacts
Socioeconomics and Environmental Justice (Section 4.5)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	The beddown of 59 aircraft would bring 2,481 military and contractor personnel to Eglin Air Force Base (AFB) and the surrounding region of influence (ROI). The Air Force assumed that 2.2 dependents would accompany the military and contractor personnel for a total of 5,458 dependents. The total increase in population directly related to the JSF Initial Joint Training Site (IJTS) would be 7,939 persons, an increase of 2.05 percent. Employment created by the beddown would add 2,481 jobs directly and thereby induce an additional 1,039 jobs for a total employment increase of 1.82 percent over existing conditions. The induced employment would most likely be filled by local workers or spouses of the incoming personnel. However, if the induced employment is filled by workers migrating to the area, an additional 1,039 persons could be expected bringing the total population increase to 2.32 percent over existing conditions. Assuming one job represents one household, a total of 3,520 housing units would be demanded as a result of the beddown. Okaloosa County alone currently has approximately 22,000 vacant housing units, including seasonal rentals. Therefore, it is anticipated that the local housing market is sufficient to meet the demands of the incoming population. Accompanying the incoming personnel from the F-35 beddown would be an estimated 1,294 school-aged children, increasing the student population 2.03 percent over existing conditions. All of the school districts in the ROI have average class sizes below the state-mandated maximum class sizes. There is also a program in which parents have the option to apply for a waiver for students to attend schools outside of their resident attendance zone. Therefore, it is anticipated that the school districts have the capacity to accommodate the increase in student population while remaining compliant with maximum class size mandates. Additionally, the increase in population increases the tax base on which the school districts are dependent on for funding. The increase in population would result in an estimated increase in revenues of $13.08 million. For public services, the change in population is not expected to substantially change the demand for law enforcement, fire fighting services, or health care professionals. An estimated 20 law enforcement officers, 26 fire fighters, and 329 health care professionals may be required in order to maintain the existing level of service as calculated by the ratio of service providers per 1,000 persons. Construction projects associated with supporting the 59 aircraft would generate additional employment in the local region, particularly in the construction industry. It is possible that construction workers may migrate to the area. However, with the current capacity in the construction industry, it is anticipated that construction positions would be filled by local workers. The construction activities and revenues would generate temporary beneficial impacts to employment and economic activity in the ROI. No disproportionate adverse impacts or risks to children are anticipated as a result of personnel changes or construction activities associated with the beddown of 59 aircraft.

Table 2-17. Potential Impacts from the Implementation of the JSF Beddown Construction and Ground Operation Activities, Cont'd

Alternative	Potential Impacts
Transportation (Section 4.6)	
No Action 1A	Impacts of construction-related traffic (construction vehicles and trips generated by construction workers) are temporary in nature and cannot be accurately modeled using the transportation model. Therefore this assessment of potential impacts is qualitative in nature. Eight roadway segments within the study area are currently deficient with respect to the adopted level of service (LOS) and all eight of these operate at LOS F in the peak-hour, peak-direction including portions of Florida Highway (Hwy) 85, U.S. Highway (US 98), and Hwy 189. Any impacts from construction-related traffic will negatively impact these facilities. Hwy 85 currently fails in the peak hour from Interstate 10 (I-10) south through Crestview, as well as in the vicinity of the Air Combat Command (ACC) Gate and from Hwy 20 to Hwy 397 east of the Commercial Gate/North Gate. Construction vehicles should coordinate routes with the county and the Florida Department of Transportation (FDOT) to avoid peak-hour impacts on these facilities.
1I	Construction-related impacts for this alternative would be substantially the same as those listed in the No Action Alternative. In addition, should the construction of the new runway northwest of RW 12/30 require relocation of Hwy 85, General Bond Boulevard or Hwy 123, or any portions thereof, then significant impacts to the regional transportation network would be anticipated, during the reconstruction or relocation of these facilities. Temporary closure of these facilities during construction-related activities would result in significant impacts during the peak travel hours and would need to be coordinated with adjacent jurisdictions and the FDOT to minimize impacts to the traveling public. Temporary closure of or loss of capacity of these facilities would also potentially negatively impact hurricane evacuation times for the coastal communities and Eglin AFB during a storm event. Hwy 85 is the main access roadway through the center of Okaloosa County between Niceville/Valparaiso and Crestview with the nearest parallel facilities being Hwy 285 to the east (from Hwy 20 in Niceville to US 90 in Walton County approximately 14 miles east of Crestview) and Hwy 87 to the west from US 98 to US 90 in Santa Rosa County.
2A 2B 2C 2D 2E	Construction-related impacts for these alternatives would be substantially the same as those listed in the No Action Alternative. Additional transportation impacts would be anticipated in the Hwy 85 corridor that provides access to the Duke Field area. Currently scheduled improvements will not completely address the existing deficiency; thus, mitigation measures could be necessary if the Proposed Action is shown to have a significant impact on the operations of Hwy 85.

Table 2-17. Potential Impacts from the Implementation of the JSF Beddown Construction and Ground Operation Activities, Cont'd

Alternative	Potential Impacts
Utilities (Section 4.7)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	Potable water and wastewater would remain within permitted limits under all alternatives; therefore, no adverse impacts are expected. Although additional infrastructure may be required, increased electricity and natural gas consumption would not cause an adverse impact to the electrical or natural gas supply in Northwest Florida.
Air Quality (Section 4.8)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	Individual pollutant emissions from construction and personnel activities associated with the project would be minimal, not exceeding 1.6 percent of the total ROI emissions under any of the alternatives for each corresponding pollutant, despite a temporary increase in criteria pollutant emissions. The slight increase in local air quality emissions due to construction would be temporary. Small increases in vehicular emissions from daily commutes and increases in public traffic are not expected to adversely impact overall air quality.
Health and Safety (Section 4.9)	
No Action **1A**	**Explosives Safety -** Facilities for ordnance storage would be constructed at the existing munitions storage area (MSA) and designed and fully licensed for the ordnance they store. Additionally, Eglin AFB would develop and implement appropriate explosive safety quantity distances (ESQDs) to mitigate potential hazards associated with the storage of munitions at these locations. No adverse impacts to explosive safety from implementation of the No Action Alternative are anticipated. **Ground Safety -** No unusual ground safety risks would be expected from ground operations or demolition/construction activities as current operational processes and procedures, as well as standard industrial safety standards would be followed. Any unique training associated with F-35 crash response would also have to be extended to personnel from local fire departments.
1I	**Explosives Safety -** Creation of a taxiway and explosives transport route over a public highway would require careful planning and engineering in order to ensure that the safety of military personnel and the public is maintained. All ordnance would be handled by trained and qualified personnel in accordance with all explosive safety standards and detailed published technical data. Creation of new weapons storage, maintenance, and loading areas would require consideration of new ESQDs. By acting within the current Air Force, state, and federal regulatory framework and through careful planning and implementation of best management practices (BMPs), ground safety risks associated with Alternative 1I would be expected to be minimal and no adverse impacts are likely.

Table 2-17. Potential Impacts from the Implementation of the JSF Beddown Construction and Ground Operation Activities, Cont'd

Alternative	Potential Impacts
	Ground Safety - Transport of live munitions and taxiing of military aircraft across a busy public highway would increase concerns of public safety. Fire response and EOD personnel would need to be made aware of any specific issues or techniques required for dealing with potential incidents involving this and other aircraft, as well as live ordnance. Any unique training associated with F-35 crash response would also have to be extended to personnel from local fire departments.
2A 2B 2C 2D 2E	**Explosives Safety -** Alternative 2 would require construction of new explosives handling facilities. All ordnance would be handled by trained and qualified personnel in accordance with all explosive safety standards and detailed published technical data. Creation of new weapons storage, maintenance, and loading areas would require consideration of new ESQDs. By acting within the current Air Force, state, and federal regulatory framework and through careful planning and implementation of BMPs, ground safety risks associated with these alternatives would be expected to be minimal and no adverse impacts are likely. **Ground Safety –** Any unique training associated with F-35 crash response would also have to be extended to personnel from local fire departments. Specific procedures are implemented for minimizing the risk of fire from range operations; therefore, implementation of these alternatives would not result in heightened ground safety concerns.
Solid Waste (Section 4.10)	
No Action 1A	Construction activities (including demolition) are expected to generate approximately 244,911 tons of debris. If construction activities occur over a three-year period this will result in a 40 percent increase of debris generated within the tri-county ROI when compared with the average generation rate.
1I	Construction associated with runway expansion is estimated to generate an additional 4,340 tons of debris. This equates to an increase of 2.14 percent when compared with the construction and demolition waste generated within the tri-county ROI.
2A 2B 2C	It is estimated that construction under these alternatives would generate 22,608 tons of debris. This quantity of debris is an increase of 11 percent when compared with the generation rate within the tri-county ROI.
2D 2E	The construction anticipated under these alternatives is estimated to generate 15,556 tons of debris. Comparing this quantity of debris to the generation rate within the tri-county ROI results in a net increase of the generation rate of 7.7 percent.
Hazardous Materials and Waste (Section 4.11)	
No Action 1A	No adverse impacts would result from construction activities in the potential use or disposal of hazardous materials and wastes. Any asbestos-containing materials (ACM) or lead-based paint (LBP) generated during renovation/demolition would be disposed of in accordance with state and federal regulations. No impacts are anticipated from the presence of the ten environmental restoration program (ERP) sites located within the proposed footprint for the JSF IJTS and MSA. Any construction activities occurring near an existing ERP site would be coordinated with Eglin's Environmental Restoration Branch.

Table 2-17. Potential Impacts from the Implementation of the JSF Beddown Construction and Ground Operation Activities, Cont'd

Alternative	Potential Impacts
1I	The runway extension is not expected to generate ACM or LBP wastes. There are no ERP sites located within the construction footprint and one closed Area of Concern (AOC-50) is nearby. No adverse impacts are expected with the construction of the runway extension.
2A 2B 2C	The construction of the parallel runways and LHA proposed area includes a number of ERP, AOC and point of interest (POI) sites that are currently undergoing remedial actions or corrective measures. By coordinating construction activities that are near these sites with Eglin's Environmental Restoration Branch, no adverse impacts are expected. As there are no existing structures located in the proposed area, there are no potential impacts from ACM or LBP.
2D 2E	The proposed area would be similar to that in Alternatives 2A, 2B, and 2C, thus, ERP, AOC, and POI sites would need to be considered in planning and construction activities. Coordination with the Environmental Restoration Branch for construction near ERP sites would occur.
Physical Resources (Section 4.12)	
No Action 1A	No impacts to physical resources would occur.
1I	No direct impacts to surface waters, wetlands, and floodplains would occur. A Coastal Zone Management Act (CZMA) Determination addresses impacts to coastal zone areas. Implementation of Alternative 1I would increase the potential for increased rate and volume of stormwater runoff which would increase the amount of sediment and pollutant runoff into nearby surface waters, wetlands, and floodplains. However, the Air Force would obtain the necessary permits and would implement any required site-specific management actions and BMPs so that no adverse impacts to water quality from construction activities would occur.
2A 2B 2C	There are no surface waters, wetlands, or floodplains on the Duke Field installation. The construction footprint for the proposed location of the parallel runway east of Duke Field does contain surface waters and wetland areas; however, there are no floodplains in that location. Construction over surface waters or within wetland areas would be avoided thus, no direct impacts to surface waters and wetlands would occur. Implementation of Alternative 2A, 2B, or 2C would increase the potential for an increased rate and volume of stormwater runoff which would increase the amount of sediment and pollutant runoff into nearby surface waters, wetlands, and floodplains. However, the Air Force would obtain the necessary permits and implement any required site-specific management actions and BMPs so that no adverse impacts to water quality from construction activities would occur.
2D 2E	There are no surface waters, wetlands, or floodplains on the Duke Field installation. Implementation of Alternative 2D or 2E would increase the potential for increased rate and volume of stormwater runoff. However, the Air Force would obtain the necessary permits and implement any required site-specific management actions so no adverse effects from stormwater runoff would be expected.

Table 2-17. Potential Impacts from the Implementation of the JSF Beddown Construction and Ground Operation Activities, Cont'd

Alternative	Potential Impacts
Biological Resources (Section 4.13)	
No Action 1A	The project area for the No Action Alternative and Alternative 1A is predominately urban/landscaped and is located adjacent to the flight line, with little wildlife value or sensitive habitats. Therefore, no adverse impacts would occur to flora, fauna, sensitive habitats, or sensitive species. The Okaloosa darter stream north of the proposed JSF MSA expansion area (Toms Creek) may be affected by sedimentation and runoff from the construction activities at the MSA. It is approximately 700 feet from the proposed MSA expansion area to Toms Creek, with at least a portion of this being vegetated. To reduce potential runoff issues, erosion control measures such as silt fencing would be used near Toms Creek. A letter from the U.S. Fish and Wildlife Service (USFWS) indicates that any future developments impacting RCW inactive trees on Eglin AFB Main Base are not likely to adversely affect the RCW. The JSF beddown is not likely to adversely affect the RCW or the Okaloosa darter, and overall impacts to biological resources would not be adverse.
1I	Land clearing for JSF beddown construction under Alternative 1I would involve disturbing a small portion of high quality habitat; however, most of the habitat is low quality Sandhills association and ample quality habitat exists elsewhere on Eglin Reservation. Therefore, no adverse impacts would occur to flora, fauna, sensitive habitats, or sensitive species. Garnier Creek is located immediately adjacent to the proposed expansion runway and Toms Creek, which is an Okaloosa darter stream, is located about 1,700 feet from the proposed runway. Erosion control methods, like those discussed above, would be required to reduce potential runoff issues. Three inactive RCW trees would be removed during construction, however, Eglin Natural Resources biologists indicate there is extremely low potential for any of these clusters to become active due to the low quality of the habitat. It is not likely that impacts to the RCW, Okaloosa darter, or biological resources overall would be adverse.
2A 2B 2C	These alternatives would involve clearing up to approximately 250 acres of High Quality Natural Communities. A reduction in prescribed fire would occur in the proximity of all Alternative 2 sites and in the areas along the access roads. Although there would be a reduction in acreage and degradation of certain sensitive habitats, similar habitats exist on other portions of Eglin and would continue to be maintained. Overall, impacts to these sensitive habitats would not be significant for any of the Alternative 2 locations. The project area for Alternatives 2A, 2B, and 2C is approximately 1 mile from the nearest Okaloosa darter streams to the south and west. These alternatives would involve the clearing of 768 acres of RCW habitat, 5 active RCW trees, and 22 inactive trees. Eglin is currently implementing an active recruitment cluster program to grow the population in order to ensure that the potential loss of a few clusters would have no impact. At the population level and recovery unit level, the proposed tree clearing is not likely to adversely affect the RCW, and impacts to the RCW would not be significant.

Table 2-17. Potential Impacts from the Implementation of the JSF Beddown Construction and Ground Operation Activities, Cont'd

Alternative	Potential Impacts
2D **2E**	The Alternatives 2D and 2E project area consists of approximately 95 percent Sandhills ecological association, and none of the disturbed area is considered high quality or sensitive habitat. Therefore, no adverse impacts would occur to flora, fauna, sensitive habitats, or sensitive species. The nearest Okaloosa darter stream is approximately 1,000 feet south of the project area and there is sufficient vegetative buffer in the area between, so it is not likely that the stream would be affected adversely. There are four inactive RCW trees that would be removed during land clearing and construction. The nearest active RCW cluster is over a mile away from the proposed site, the quality of the habitat within the site is poor, and there is ample suitable habit availability elsewhere, so construction and daily activities are not likely to adversely affect the RCW at this site. Overall, there would be no adverse impacts to biological resources.
Cultural Resources (Section 4.14)	
No Action	National Register of Historic Places (NRHP)-eligible resources have the potential to be adversely affected. However, execution of the amended project-specific programmatic agreement provides for resolution of adverse effects; therefore, no adverse effects to cultural resources would be expected under this alternative.
1A	No adverse effects to cultural resources would be expected under this alternative. No historic properties considered eligible to the NRHP are located within this alternative area.
1I	Adverse effects to cultural resources would be expected under this alternative. One NRHP-eligible historic homestead site (8OK2750) is located within this APE and, therefore, has the potential to be impacted by Alternative 1I. To address the National Historic Preservation Act (NHPA) Section 106 process, an amended project-specific programmatic agreement based on the SEIS was completed and is provided in Appendix F, *Cultural Resources*. As per the amended programmatic agreement, avoidance of the resource is recommended, or data recovery and/or other mitigation, if avoidance is not feasible.
2A **2B** **2C**	Adverse effects to cultural resources would be expected under this alternative. One archaeological site (8OK333) considered eligible for listing on the NRHP is present within the area of potential effect (APE) under Alternatives 2A, 2B, and 2C. To address the NHPA Section 106 process, an amended project-specific programmatic agreement based on the SEIS was completed and is provided in Appendix F, *Cultural Resources*. As per the amended programmatic agreement, avoidance of the resource is recommended, or data recovery and/or other mitigation, if avoidance is not feasible.
2D **2E**	No adverse effects to cultural resources are expected under these alternatives. No historic properties considered eligible to the NRHP are located within this alternative area.

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training

Alternative	Potential Impacts
Airspace (Section 4.2)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	JSF flight training operations would impact air traffic controller workload and contribute to increased congestion (air and ground delays) for military and civilian aircraft across the region. The JSF flight operations would contribute to an already congested airspace created by the continuing growth of other civilian and military aviation customers in the region. The complex regional airspace configuration and use calls for modifications involving all of the civilian and military users of the airspace. The regional airspace study discussed in Section 7.2.4 of the FEIS (i.e., the Gulf Regional Airspace Strategic Initiative [GRASI]) developed recommendations (Section 1.2.6) to accommodate the airspace needs of a growing military mission and progressively increasing civilian population.
Noise (Section 4.3)	
No Action	Under the No Action Alternative, 693 acres and an estimated 1,797 persons off-installation could be exposed to noise levels exceeding 65 decibels (dB) day-night average sound level (DNL) near Eglin Main Base. No persons off-installation would be exposed to noise levels exceeding 80 dB DNL and the risk of hearing loss would be relatively low. In the vicinity of Duke Field, 1 acre and an estimated 1 person off-installation could be exposed to noise exceeding 65 dB DNL and at Choctaw Field, 2,128 acres and 2 persons off-installation could be exposed to noise levels greater than 65 dB DNL. Noise impacts could include annoyance, activity interruption, hearing loss, and potentially nonauditory health effects. Noise impacts in military training airspace would not exceed 65 dB L_{dnmr} except beneath R-2915B where the level would be 66 dB L_{dnmr}. (L_{dnmr} is the onset-rate adjusted monthly day-night average sound level, which is used to describe subsonic noise in military airspace.) Sonic boom noise levels in those over-water training areas that permit supersonic training would remain well below 55 dB C-weighted day-night average sound level (CDNL). The number of live munitions used on Eglin Range would increase slightly, but the CDNL noise contours off-range would not change in extent.
1A	Under Alternative 1A, 1,073 acres and an estimated 2,910 persons off-installation could be exposed to noise levels exceeding 65 dB DNL near Eglin Main Base. An estimated population of 97 persons off-installation could be exposed to noise levels ranging between 80 dB DNL and 85 dB DNL. Those persons would be considered the population at the most risk for potential hearing loss (PHL). In the vicinity of Duke Field, 1 acre and an estimated 1 person off-installation could be exposed to noise exceeding 65 dB DNL; at Choctaw Field, 2,128 acres and 2 persons off-installation could be exposed to noise levels greater than 65 dB DNL. Noise impacts could include annoyance, activity interruption, hearing loss, and potentially nonauditory health effects. Noise impacts in military training airspace would be the same as under the No Action Alternative. Increased munitions noise on Eglin Range would not change CDNL noise contours off-range.

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
1I	Under Alternative 1I, 716 acres and an estimated 1,858 persons off-installation could be exposed to noise levels exceeding 65 dB DNL near Eglin Main Base. No persons off-installation would be exposed to noise levels exceeding 80 dB DNL, and the risk of hearing loss would be relatively low. In the vicinity of Duke Field, 1 acres and an estimated 1 person off-installation could be exposed to noise exceeding 65 dB DNL; at Choctaw Field, 2,126 acres and 2 persons off-installation could be exposed to noise levels greater than 65 dB DNL. Noise impacts could include annoyance, activity interruption, hearing loss, and potentially nonauditory health effects. Noise impacts in military training airspace would be the same as under the No Action Alternative. Increased munitions noise on Eglin Range would not change CDNL noise contours off-range.
2A	Under Alternative 2A, 614 acres and an estimated 1,566 persons off-installation could be exposed to noise levels exceeding 65 dB DNL near Eglin Main Base. No persons off-installation would be exposed to noise levels exceeding 80 dB DNL and the risk of hearing loss would be relatively low. In the vicinity of Duke Field, 912 acres and an estimated 568 persons off-installation could be exposed to noise exceeding 65 dB DNL; at Choctaw Field, 2,348 acres and 2 persons off-installation could be exposed to noise levels greater than 65 dB DNL. Noise impacts could include annoyance, activity interruption, hearing loss, and potentially nonauditory health effects. Noise impacts in military training airspace would be the same as under the No Action Alternative. Increased munitions noise on Eglin Range would not change CDNL noise contours off-range.
2B	Under Alternative 2B, 733 acres and an estimated 1,915 persons off-installation could be exposed to noise levels exceeding 65 dB DNL near Eglin Main Base. An estimated population of 19 persons off-installation could be exposed to noise levels ranging between 80 dB DNL and 81 dB DNL. Those persons would be considered the population at the most risk for PHL. In the vicinity of Duke Field, 887 acres and an estimated 567 persons off-installation could be exposed to noise exceeding 65 dB DNL; at Choctaw Field, 89 acres and 0 persons off-installation could be exposed to noise levels greater than 65 dB DNL. Noise impacts could include annoyance, activity interruption, hearing loss, and potentially nonauditory health effects. Noise impacts in military training airspace would be the same as under the No Action Alternative. Increased munitions noise on Eglin Range would not change CDNL noise contours off-range.
2C	Under Alternative 2C, 735 acres and an estimated 1,917 persons off-installation could be exposed to noise levels exceeding 65 dB DNL near Eglin Main Base. An estimated population of 17 persons off-installation could be exposed to noise levels ranging between 80 dB DNL and 81 dB DNL. Those persons would be considered the population at the most risk for PHL. In the vicinity of Duke Field, 827 acres and an estimated 534 persons off-installation could be exposed to noise exceeding 65 dB DNL; at Choctaw Field, 2,233 acres and 2 persons off-installation could be exposed to noise levels greater than 65 dB DNL. Noise impacts could include annoyance, activity interruption, hearing loss, and potentially nonauditory health effects. Noise impacts in military training airspace would be the same as under the No Action Alternative. Increased munitions noise on Eglin Range would not change CDNL noise contours off-range.
2D	Under Alternative 2D, 738 acres and an estimated 1,927 persons off-installation could be exposed to noise levels exceeding 65 dB DNL near Eglin Main Base. An estimated population of 13 persons off-installation could be exposed to noise levels ranging between 80 dB DNL and 81 dB DNL. Those persons would be considered the population at the most risk for PHL. In the vicinity of Duke Field, 708 acres and an estimated 774 persons off-installation could be exposed to noise exceeding 65 dB

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
	DNL; at Choctaw Field, 2,108 acres and 2 persons off-installation could be exposed to noise levels greater than 65 dB DNL. Noise impacts could include annoyance, activity interruption, hearing loss, and potentially nonauditory health effects. Noise impacts in military training airspace would be the same as under the No Action Alternative. Increased munitions noise on Eglin Range would not change CDNL noise contours off-range.
2E	Under Alternative 2E, 605 acres and an estimated 1,541 persons off-installation could be exposed to noise levels exceeding 65 dB DNL near Eglin Main Base. No persons off-installation would be exposed to noise levels exceeding 80 dB DNL and the risk of hearing loss would be relatively low. In the vicinity of Duke Field, 780 acres and an estimated 828 persons off-installation could be exposed to noise exceeding 65 dB DNL; at Choctaw Field, 2,431 acres and 2 persons off-installation could be exposed to noise levels greater than 65 dB DNL. Noise impacts could include annoyance, activity interruption, hearing loss, and potentially nonauditory health effects. Noise impacts in military training airspace would be the same as under the No Action Alternative. Increased munitions noise on Eglin Range would not change CDNL noise contours off-range.
Land Use (Section 4.4)	
No Action	Sensitive noise receptors at Eglin Main Base exposed to noise (greater than 75 dB DNL) include the Oakhill School, horse stables, and a portion of the Georgia Avenue housing area. The entire developed area of Duke Field would be exposed to noise (greater than 75 dB DNL). There would be no impact on land use compatibility at Choctaw Field. The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 685, 0.08, and 2,134 acres, respectively. Off-base land use compatibility impacts be greatest northeast of Eglin Main Base in Valparaiso and Niceville. The use of Duke Field would impact unincorporated areas of Okaloosa County, southeast of Crestview. Affected off-base property south of Choctaw Field is primarily undeveloped land and no adverse impacts would occur.
1A	The on-base areas affected by the noise from air operations would be similar to the No Action Alternative. Noise exposures would be greater on the east side of the airfield at Eglin Main Base. Affected off-base areas would be similar to those described for the No Action Alternative. The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 1,070, 0.08, and 2,127 acres, respectively. Larger areas of Valparaiso and Niceville would be impacted because of the heavier use of the Eglin Main Base airfield. Impacts at Duke Field would be the same as those described under the No Action Alternative, the entire developed area of Duke Field would be exposed to noise (greater than 75 dB DNL). No adverse impacts would occur at or surrounding Choctaw Field.
1I	The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 699, 0.08, and 2,128 acres, respectively. Noise exposures would affect smaller areas of Valparaiso and Niceville because of the heavier use of the new runway. Off-base noise exposures near Duke Field and Choctaw Field would be similar to Alternative 1A.

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
2A	The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 603, 912, and 2,348 acres, respectively. Use of the new runway at Duke Field would shift the off-base noise exposures to the east of Shoal River. No adverse impacts would occur at or surrounding Choctaw Field. Eglin Main Base would not be utilized for JSF air operations.
2B	The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 718, 887, and 89 acres, respectively. The affected off-base area north of Duke Field would be smaller than under Alternative 2A because of the heavier use of Eglin Main Base. Choctaw Field would not be utilized for JSF operations.
2C	The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 719, 827, and 2,233 acres, respectively. The total off-base area affected by noise from air operations at Eglin Main Base would be slightly smaller than Alternative 2B because of the additional use of Choctaw Field. No adverse impacts would occur at Choctaw Field.
2D	The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 723, 708, and 2,107 acres, respectively. Under Alternative 2D, the total off-base area affected by noise from air operations at Eglin Main Base would be similar to Alternative 2B and the affected off-base area north of Duke Field would be slightly smaller than Alternatives 2A, 2B, and 2C. No adverse impacts would occur at Choctaw Field.
2E	The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 593, 787, and 2,432 acres, respectively. The affected off-base area north of Duke Field would be slightly greater than Alternative 2D. No adverse impacts would occur at Choctaw Field. Eglin Main Base would not be utilized for JSF air operations.
Socioeconomics and Environmental Justice (Section 4.5)	
No Action	Average noise levels above 65 dB DNL would impact approximately 1,797 residents in the vicinity of Eglin Main Base, one resident in the vicinity of Duke Field, and two residents in the vicinity of Choctaw Field. The highest average noise levels between 75 and 79 dB DNL would impact an estimated 174 residents in the vicinity of Eglin Main Base. The remaining residents affected by high noise levels would be impacted by noise levels between 65 dB DNL and 74 dB DNL. Under these conditions, it is not expected that the change in noise levels from the F-35 would impact property values or quality of life for residents. However, residents affected by the noise levels may be annoyed by overflights. Tourism would not be adversely affected as the highest noise levels are directed away from the beaches and waterways that have the potential for high concentrations of tourists. Therefore, noise levels under the No Action Alternative are not expected to have significant adverse socioeconomic impacts. For environmental justice, noise has been identified as an adverse impact that could potentially have disproportionate impacts. The only minority and low-income populations affected by noise levels greater than 65 dB DNL are in the vicinity of Eglin Main Base for which Okaloosa County is the community of comparison. Noise is not expected to disproportionately impact minority or low-income populations. The minority population comprises 21.54

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
	percent of the total affected population compared with 22.9 percent of the total population in Okaloosa County. The low-income population comprises 8.18 percent of the total affected population compared with nearly 10.6 percent of the total low-income population in Okaloosa County. Eglin Elementary and the First Assembly of God private school would be affected by noise levels between 65 and 75 dB DNL. The Childcare Network daycare center would be affected by noise levels between 75 and 79 dB DNL. School and daycare facilities exposed to noise levels above 75 dB DNL are not considered to be compatible uses or compatible outdoor land use and could increase the risk of hearing loss in children. The Childcare Network daycare center would not be compatible with these noise levels regardless of noise level reduction.
1A	An estimated additional 2,913 residents would be impacted by noise levels above 65 dB DNL compared with the No Action Alternative. Most of these residents would be in the vicinity of Eglin Main with an estimated three residents in the vicinity of Duke Field and Choctaw Field. Ninety-seven (97) residents would be impacted by noise levels between 80 and 84 dB DNL. Although property values are more likely to be directly affected by other factors, such as property or neighborhood characteristics and the local real estate market, there may be the potential that aircraft noise could have an adverse impact on property values. Noise levels generated by 59 F-35 aircraft with unconstrained flight operations would not directly impact areas where high concentrations of tourism are expected, specifically on the beaches and coastline properties. Individuals involved in outdoor recreation do have the potential to be annoyed by noise generated from overflights; however, it is not expected that these noise levels would discourage tourism as a whole in the region of influence (ROI). Therefore, the beddown of 59 F-35 aircraft without constraints on flight operations could have an adverse impact on the socioeconomic conditions in the ROI, specifically on property values. For environmental justice, no adverse impacts are anticipated to disproportionately impact minority, low-income, or youth populations. The share of minority and low-income persons affected by adverse noise levels above 65 dB DNL are less than the community of comparison. The share of children affected by these noise levels is comparable to the community of comparison. A total of three schools would be exposed to average noise levels 65 dB DNL and above. Eglin Elementary, First Assembly of God private school, and the Okaloosa Science, Technology, Engineering, Mathematics, and Medical (STEMM) Center would be exposed to noise level between 70 and 75 dB DNL. The Childcare Network daycare could be exposed to noise levels between 75 and 80 dB DNL while the Angels Are Us Learning Center and the Gailey Family Daycare Home could be exposed to noise levels between 65 and 70 dB DNL. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation efforts. Therefore, the noise levels generated by 59 aircraft without flight limitations and the potentially adverse impacts to children may be considered significant.
1I	Flight operations would impact an estimated additional 62 residents with average noise levels above 65 dB DNL compared with the number of residents impacted by noise levels under the No Action Alternative. The highest noise levels would be between 75 dB and 79 dB DNL, impacting an estimated total of 226 residents. Although property values are more likely to be directly affected by other factors, such as property or neighborhood characteristics and the local real estate market, there may be the potential that aircraft noise could have an adverse impact on property values. Noise levels generated would not directly impact high tourist areas such as area beaches or coastlines. Outdoor recreation could be disrupted by overflights and could be considered annoying to individuals. No adverse impacts are expected to disproportionately impact minority or

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
	low-income populations. The share of minority and low-income persons affected by adverse noise levels above 65 dB DNL are less than the community of comparison. The share of children of the total population is slightly higher at 28.7 percent than the share of children in the Okaloosa County population. The following three schools could be exposed to noise levels between 65 and 70 dB DNL: First Assembly of God private school, Eglin Elementary School, and the Okaloosa STEMM Center. No schools would be affected by noise levels greater than 70 dB DNL The Childcare Network, could be exposed to noise levels between 75 and 80 dB DNL. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation. Therefore, the noise levels generated under Alternative 1I could have adverse impacts to children that may be considered significant.
2A	Flight operations would impact an estimated 336 more residents with average noise levels above 65 dB DNL compared with the number of residents impacted by noise levels under the No Action Alternative. The highest noise levels would be between 75 dB and 79 dB DNL impacting an estimated total of 199 residents. The number of residents affected by these noise levels in the vicinity of Eglin Main Base would decrease by 231 as compared with the No Action Alternative. Due to the reduction in noise at Eglin Main Base adverse impacts on property values are possible but these impacts are anticipated to be less widespread throughout the ROI and the value discounts of affected properties are not anticipated to be as extensive compared with the No Action Alternative or Alternative 1A. Noise levels generated would not directly impact high tourist areas such as area beaches or coastlines. Outdoor recreation could be disrupted by overflights and could be considered annoying to individuals. The share of minority persons affected by high noise levels is greater than the community of comparison due to noise levels above 65 dB DNL affecting Census Tract 203.02, Block 1197, which includes the Okaloosa Correctional Institute and the Okaloosa Youth Academy. The existing structure and construction of these incarceration facilities is expected to provide the necessary noise attenuation needed to be compatible according to Federal Aviation Administration (FAA) and Department of Defense (DoD) land use compatibilities. The share of low-income persons affected by high noise levels is comparable to the community of comparison. The Valparaiso First Assembly of God Pre-School could be exposed to noise levels between 65 and 69 dB DNL while the Childcare Network daycare could be exposed to noise levels between 75 and 80 dB DNL. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation. Therefore, the noise levels generated under Alternative 2A could have adverse impacts to children.
2B	Flight operations would impact an additional 684 residents with average noise levels above 65 dB DNL compared with the number of residents impacted by noise levels under the No Action Alternative. The highest noise levels would be between 80 dB and 84 dB DNL impacting a total of 19 residents. Although property values are more likely to be directly affected by other factors, such as property or neighborhood characteristics and the local real estate market, there may be the potential that aircraft noise could have an adverse impact on property values. Noise levels generated would not directly impact high tourist areas such as area beaches or coastlines. Outdoor recreation could be disrupted by overflights and could be considered annoying to individuals. The share of minority persons affected by high noise levels is greater than the community of comparison due to noise levels above 65 dB DNL affecting Census Tract 203.02, Block 1197, which includes the Okaloosa Correctional Institute and the Okaloosa Youth Academy. The existing structure and construction of these incarceration facilities is expected to provide the necessary noise attenuation needed to be compatible according to FAA and

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
	DoD land use compatibilities. The share of low-income persons affected by high noise levels is comparable to the community of comparison. Children would comprise approximately 23.7 percent of the total population affected by noise levels greater than 65 dB DNL which is comparable to the 22.2 percent of the total population children comprise in Okaloosa County. The Okaloosa STEMM Center, Eglin Elementary, and Valparaiso First Assembly of God preschool could be exposed to noise levels below 70 dB DNL. The Childcare Network daycare could be exposed to noise levels between 75 and 79 dB DNL. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation. Therefore, the noise levels generated under Alternative 2B could have adverse impacts to children that may be considered significant.
2C	Flight operations would impact an additional 653 residents with average noise levels above 65 dB DNL in the vicinity of Eglin Main compared with the number of residents impacted by noise levels under the No Action Alternative. The highest noise levels would be between 80 dB and 84 dB DNL impacting a total of 17 residents. Although property values are more likely to be directly affected by other factors, such as property or neighborhood characteristics and the local real estate market, there may be the potential that aircraft noise could have an adverse impact on property values. Noise levels generated would not directly impact high tourist areas such as area beaches or coastlines. Outdoor recreation could be disrupted by overflights and could be considered annoying to individuals. The share of minority persons affected by high noise levels is greater than the community of comparison due to noise levels above 65 dB DNL affecting Census Tract 203.02, Block 1197, which includes the Okaloosa Correctional Institute and the Okaloosa Youth Academy. The existing structure and construction of these incarceration facilities is expected to provide the necessary noise attenuation needed to be compatible according to FAA and DoD land use compatibilities. The share of low-income persons affected by high noise levels is comparable to the community of comparison. Children under the age of 18 would comprise approximately 23.8 percent of the population affected by noise levels greater than 65 dB DNL which is comparable to the community of comparison. The Okaloosa STEMM Center, Valparaiso First Assembly of God preschool, and Eglin Elementary could be exposed to noise levels between 65 and 69 dB DNL. The Childcare Network daycare could be exposed to noise levels between 75 and 79 dB DNL. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation. Therefore, the noise levels generated under Alternative 2C could have adverse impacts to children that may be considered significant.
2D	Flight operations would impact an additional 903 residents with average noise levels above 65 dB DNL in the vicinity of Eglin Main and Duke Field compared with the number of residents impacted by noise levels under the No Action Alternative. One resident in the vicinity of Choctaw Field would be affected by higher noise levels as compared with the No Action Alternative. The highest noise levels would be between 80 dB and 84 dB DNL impacting a total of 13 residents in the vicinity of Eglin Main. Although property values are more likely to be directly affected by other factors, such as property or neighborhood characteristics and the local real estate market, there may be the potential that aircraft noise could have an adverse impact on property values. Noise levels generated would not directly impact high tourist areas such as area beaches or coastlines. Outdoor recreation could be disrupted by overflights and could be considered annoying to individuals. Noise levels above 65 dB DNL would impact Census Tract 203.02, Block 1197, which includes the Okaloosa Correctional Institute and the Okaloosa Youth Academy. The existing structure and construction of these incarceration facilities is expected to provide the necessary noise attenuation needed to be compatible according to FAA and DoD land use compatibilities.

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
	Children would comprise approximately 22.4 percent of the affected population which is nearly the same proportion children comprise in Okaloosa County as a whole. Three schools and one daycare in the vicinity of Eglin Main Base could be exposed to noise levels greater than 65 dB DNL The First Assembly of God private school, Eglin Elementary School, and the Okaloosa STEMM Center could be exposed to noise levels between 65 and 69 dB DNL. The Childcare Network daycare center could be exposed to noise levels between 75 and 79 dB DNL. The Okaloosa County Youth Academy could be exposed to noise levels between 65 and 74 dB DNL. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation. Therefore, the noise levels generated under Alternative 2D could have adverse impacts to children that may be considered significant.
2E	Flight operations would impact an additional 571 residents with average noise levels above 65 dB DNL in the vicinity of Duke Field compared with the number of residents impacted by noise levels under the No Action Alternative. The highest noise levels would be between 75 dB and 79 dB DNL impacting a total of 198 residents in the vicinity of Eglin Main Base. Although property values are more likely to be directly affected by other factors, such as property or neighborhood characteristics and the local real estate market, there may be the potential that aircraft noise could have an adverse impact on property values. Noise levels generated would not directly impact high tourist areas such as area beaches or coastlines. Outdoor recreation could be disrupted by overflights and could be considered annoying to individuals. Adverse impacts from noise to minority populations in the vicinity of Duke Field could be considered disproportionate. Noise levels above 65 dB DNL would impact Census Tract 203.02, Block 1197, which includes the Okaloosa Correctional Institute and the Okaloosa Youth Academy. The existing structure and construction of these incarceration facilities is expected to provide the necessary 30 dB noise attenuation needed to be compatible according to FAA and DoD land use compatibilities. Of the population affected by noise levels greater than 65 dB DNL, children would comprise 22.2 percent of the total affected population which is the same as the proportion of children in the community of comparison. One school and one daycare in the vicinity of Eglin Main Base could be exposed to noise levels greater than 65 dB DNL. The First Assembly of God private school could be exposed to noise levels between 65 and 69 dB DNL and the Okaloosa Youth Academy could be exposed to noise levels between 65 and 69 dB DNL. The Childcare Network daycare could be exposed to noise levels between 75 and 79 dB DNL. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation. Therefore, the noise levels generated under Alternative 2E could have adverse impacts to children.
Transportation (Section 4.6)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	There are no impacts to transportation from flight training activities.

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
Utilities (Section 4.7)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	There are no impacts to utilities from flight training activities.
Air Quality (Section 4.8)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	Individual pollutant emissions from fight training activities associated with the project would be minimal, not exceeding 1.6 percent of the total ROI emissions for each corresponding pollutant, despite a temporary increase in criteria pollutant emissions. There would be slight increases in particulate emissions due to munitions use on Test Areas (TAs) C-52E and B-82. Minor increases would also occur at TA C-62 and B-75 due to the use of small arms and flares. Although the emissions levels would vary slightly across alternatives, the overall impacts to air quality from JSF flight training activities would be similar among the alternatives.
Health and Safety (Section 4.9)	
No Action	**Aircraft Mishaps –** Current safety policies and procedures at Eglin are designed to ensure that the potential for aircraft mishaps is reduced to the lowest possible level. These safety policies and procedures would continue under the JSF flight training. **Bird/Wildlife-Aircraft Strike Hazards –** Under the JSF flight training, the number of total annual sorties for all aircraft at the base would increase, thus it is expected that the number of bird strikes per year would similarly increase. However, the overall risk associated with bird-aircraft strikes is expected to remain low.
1A	The increase in the number of operations would increase the risk of aircraft mishaps and bird/wildlife-aircraft strike hazards (BASH). However through the continued implementation of current safety policies and procedures the potential impacts to health and safety under Alternative 1A would be the same as discussed above for the No Action Alternative.
1I	**Aircraft Mishaps –** Increases in total aircraft operations may increase the risk of aircraft mishaps. However, current safety policies and procedures at Eglin are designed to ensure that the potential for aircraft mishaps is reduced to the lowest possible level. These safety policies and procedures would continue under Alternative 1I. **Bird/Wildlife-Aircraft Strike Hazards –** Increases in the number of flight operations would likely lead to a proportional increase in BASH risk. Also, under Alternative 1I the expansion runway would be situated well within the FAA recommended airfield siting separation distances for wetlands. Garnier Creek and Toms Creek are located near the runway and may are likely to attract birds and wildlife that could increase the BASH risk. However, through continued coordination

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
	with the U.S. Department of Agriculture (USDA) and by implementing an adaptive management process, which may require future mitigation measures to be put into practice, the selection of Alternative 1I would not present a significant increase in BASH.
2A **2B** **2C**	**Aircraft Mishaps –** Increases in the number of flight operations overall could lead to increased risk of aircraft mishaps. However, current safety policies and procedures at Eglin are also applicable at Duke Field and are designed to ensure that the potential for aircraft mishaps is reduced to the lowest possible level. These safety policies and procedures would continue under Alternatives 2A, 2B, and 2C. **Bird/Wildlife-Aircraft Strike Hazards –** Under these alternatives the expansion runway would be incompatible with the FAA recommended airfield siting separation distances for wetlands. Honey Creek, Silver Creek, Juniper Creek, and Still Branch are located near the runway and may be likely to attract birds and wildlife that could increase the BASH risk. However, through continued coordination with the USDA and by implementing an adaptive management process, which may require future mitigation measures to be put into practice, the selection of any of these alternatives would not present a significant increase in BASH.
2D **2E**	**Aircraft Mishaps –** Increases in the number of flight operations overall could lead to increased risk of aircraft mishaps. However, current safety policies and procedures at Eglin are also applicable at Duke Field and are designed to ensure that the potential for aircraft mishaps is reduced to the lowest possible level. These safety policies and procedures would continue under Alternatives 2D and 2E. **Bird/Wildlife-Aircraft Strike Hazards –** Under Alternatives 2D and 2E the higher number of air operations would likely increase the BASH risk accordingly. However, through continued coordination with the USDA and by implementing an adaptive management process, which may require future mitigation measures to be put into practice, the selection of either of these alternatives would not present a significant increase in BASH.
Solid Waste (Section 4.10)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	Operations will result in an increase of waste generated from personnel increases and flight/maintenance activities. It is estimated that the increase in personnel at Eglin AFB will result in an increase of municipal solid waste (MSW) generated at the facility by approximately 6,418 tons per year (3.2 percent increase within the ROI). Metallic debris from aircraft maintenance will be negligible and metallic debris from ordnance expended during training is estimated to be approximately 173 tons. It is expected that the bulk of the metallic debris from maintenance and flight training will be recovered and subsequently recycled.

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
Hazardous Materials and Waste (Section 4.11)	
No Action 1A 1I 2A 2B 2C 2D 2E	Aircraft maintenance activities are expected to generate hazardous wastes similar to those produced in F-15 maintenance; therefore, Eglin is currently equipped to handle such wastes. Any unique hazards involved in maintaining the F-35 would require the implementation of appropriate hazardous waste controls to minimize risks to personnel and the environment. Munitions-related debris would generate less hazardous waste debris than those in the FEIS and are similar to activities already conducted by other units on Eglin AFB; therefore, range clearance and disposal procedures currently in place would be sufficient. Thus, no adverse impacts from aircraft maintenance or munitions use would occur. The hazardous wastes generated from munitions would not require new Emergency Planning and Community Right-to-Know Act (EPCRA) Toxics Release Inventory (TRI) reporting, and thus no adverse impacts are expected.
Physical Resources (Section 4.12)	
No Action 1A 1I 2A 2B 2C 2D 2E	There are no impacts to physical resources from flight training activities.
Biological Resources (Section 4.13)	
No Action 1A 1I 2A 2B 2C 2D 2E	**Air Operations -** Ground movements by aircraft would only occur on established air fields; therefore, no impacts from air operations would occur to sensitive habitats. Since aircraft are already a major component of the existing noise environment at Eglin, aircraft noise from the alternatives would not pose a novel or new threat to birds and wildlife that would cause adverse reactions other than temporary flight. Thus, noise from the air operations would not adversely affect protected species. **Munitions Use -** Direct impacts to sensitive habitats and species as the result of munitions are unlikely; however, some increased risk of wildfire would result from munitions use. For JSF training, wildfire operational plans would be developed with Eglin's Natural Resources Section to identify high wildfire risk conditions and notification procedures that units would follow to engage fire response personnel when needed. Munitions use would follow Eglin's Wildfire Specific Action Guide Restrictions. Noise impacts to the red-cockaded woodpecker (RCW) and bald eagle would be possible; however, RCWs and eagles continue to thrive near noisy test areas, indicating that habitat quality seems to be more influential in determining productivity, survival, and population stability than noise. The RCW is not likely to be adversely affected. Impacts to sensitive habitats and species from munitions use would not be adverse. Endangered Species Act (ESA) Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS) was conducted for the preferred alternative in the FEIS and has been incorporated by reference. The USFWS Biological Opinion has been included in Appendix H, *Biological Resources*.

Table 2-18. Potential Impacts from the Implementation of the JSF Flight Training, Cont'd

Alternative	Potential Impacts
Cultural Resources (Section 4.14)	
No Action **1A** **1I** **2A** **2B** **2C** **2D** **2E**	No adverse effects to cultural resources are expected to occur from flight training activities unless increased aircraft noise results in the abandonment of a building or structure. Adverse effects may occur from munitions use if avoidance of eligible resources is not feasible. Stipulations concerning this assessment of effects and resolution of adverse effects may be found in the Programmatic Agreement between Eglin AFB, JSF Program, Army 7th Special Forces Group (7SFG(A)) and the Florida State Historic Preservation Officer (SHPO) from the FEIS and are discussed in the amended project-specific programmatic agreement for the SEIS.

2.6 MITIGATION

Specified mitigation measures have been identified and will be carried forward, to the extent practicable, in implementing the selected actions and will be defined in the SEIS ROD. Chapter 4 includes mitigative type measures required by regulation or agency guidance for each relevant resource.

2.6.1 Defining a Mitigation Measure

The mitigation measures discussed in an EIS or SEIS cover a range of issues generally addressing mitigation measures applied in the design of reasonable alternatives (i.e., mitigation by avoidance) or address mitigations not included in the design, but applied after the impact analysis. Mitigation measures are considered even for impacts that, by themselves, would not be considered "adverse." The Eglin AFB BRAC 2005 proposal is considered as a whole to address specific effects on the environment (regardless of the level of the impacts), and mitigation measures are developed where it is feasible to do so.

CEQ regulations (at 40 CFR 1508.20) define mitigation in the following five ways:

1. **Avoiding** the impact altogether by not taking a certain action or parts of an action.
2. **Minimizing** impacts by limiting the degree or magnitude of the action, and its implementation.
3. **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment.
4. **Reducing or eliminating** the impact over time by preservation and maintenance operations during the life of the action.
5. **Compensating** for the impact by replacing or providing substitute resources or environments.

During the initial development of this project, mitigation and management measures were included in the design parameters. This meant that avoiding, minimizing, or reducing potential impacts was a priority guiding the development of alternatives. These mitigation and management measures, which are incorporated into the overall design of the alternatives, include best management practices.

A mitigation plan will be developed in accordance with 32 CFR 989.22(d). The mitigation plan will be developed to address specific mitigations that the proponents of various actions will implement if selected in the ROD. The mitigation plan, for example, will also include a Storm Water Pollution Prevention Plan (SWPPP) and a Spill Prevention, Control, and Countermeasures (SPCC) Plan or updates to these plans specific to the alternative selected. These plans are in addition to and complement any permits that may be issued to implement BRAC actions at Eglin AFB.

2.6.2 Resource-Specific Measures Proposed to Reduce the Potential for Environmental Impacts

Table 2-19 identifies proposed measures to reduce the potential for environmental impacts (see page 2-72). The table presents the measures by resource area and alternative.

Table 2-19. Potential Mitigations or Management Measures

Resource Area/ Alternative	Mitigations or Management Measures
Airspace	
1A 1I 2A 2B 2C 2D 2E	This SEIS incorporates the following recommendations from the Gulf Regional Airspace Strategic Initiative (GRASI) report (U.S. Air Force, 2011a): • **Utilization of additional special use airspace (SUA):** Additional non-Eglin-controlled airspace was incorporated to expand training opportunities. Additional SUA units evaluated include Camden Ridge/Pine Hill, Carabelle East/West, Compass Lake, Desoto/Restricted Area R-4401, Warning Area W-155, and Moody (Table 1-2). • **Relocation of some simulated flameout operations:** Simulated flameout approaches have been shifted from Eglin Main Base and Duke Field to Choctaw Field and Tyndall AFB to improve airspace in the North/South corridor. • **Creation of four new Air Traffic Control assigned airspaces (ATCAAs):** Four new ATCAAs are currently being established. • **Efficient use of airspace over R-2915 and R-2914:** This recommendation involves utilizing a new scheduling tool that would track and compare scheduled airspace with airspace actually utilized in order to increase efficiency and allow for more flexibility. Several other recommendations provided during the GRASI study could help improve overall congestion in the region and aid air traffic controllers in their decision making process. These recommendations are as follows: • **Establishment of standard instrument departures (SIDs) and standard terminal arrival routes (STARs):** This involves establishing, through coordination with other locations, route entry points for east-west aircraft traffic over shoreline airspace for ascent and descent in order to increase efficiency. • **Locating remote emitters outside of restricted areas:** At this time no decision has been made and no locations have been identified for potentially locating remote emitters outside of restricted airspace. • **Expanding operating hours to six days per week:** A study is currently being conducted on the feasibility of operating six days a week; however, a decision has not yet been made. • **Establishing new partnerships for landscape-scale training:** Landscape-scale training involves utilizing non-military airspace and compatible private, local, state, and federal lands for nonhazardous missions. A year-long study to identify requirements and opportunities for increased mission capability and flexibility was started in April 2012. • **Evaluating North Pensacola Military Operating Area (MOA) reorganization:** Reorganizing the North Pensacola MOA is currently being evaluated by the Navy for feasibility.

Table 2-19. Potential Mitigations or Management Measures, Cont'd

Resource Area/ Alternative	Mitigations or Management Measures
	• **Creating a new munitions impact area:** At this time no areas have been identified for a potential new munitions impact area. Separate analysis, if required by the National Environmental Policy Act (NEPA), would be conducted upon the decision to create a new munitions impact area. • **Creating a regional control facility:** There are no plans at this time to implement this recommendation. Separate NEPA analysis, if required, would be conducted upon the decision to construct a regional control facility.
Noise	
1A 1I 2A 2B 2C 2D 2E	Mitigations that have been incorporated into all of the alternatives, including Alternative 1A (the Preferred Alternative), in this SEIS are as follows: • Substantially reduced the number of total operations from what was analyzed in the FEIS and the 2010 Draft SEIS • Reduced the number of flights on RW 01/19 from what was analyzed in the FEIS and the 2010 Draft SEIS • Use of Practice Instrument Approach Fields (PIAFs) to reduce Instrument Landing System (ILS) use of RW 01/19 • Changed the flight profiles for all three F-35 variants • Changed the flight tracks for the Navy and Marines F-35 aircraft • Adjusted arrival and departure procedures • Reduced from the FEIS the number of "late night" (between 10:00 PM and 7:00 AM) flights • Use of flight simulators for some training The alternatives described in this SEIS were designed with noise impacts in mind. Additionally, two new alternative beddown locations with no flights on Runway (RW) 01/19 were added and analyzed. With the exception of Alternative 1A, all of the alternatives would involve relocating some percentage of the F-35 aircraft operations from the existing runways at Eglin Main Base to runways that are surrounded by fewer noise-sensitive land uses. Implementing certain alternatives would result in substantially reduced noise impacts. In furtherance of NEPA's Section 101 goals to "protect, restore, and enhance the environment" (40 Code of Federal Regulations [CFR] 1500.1(c)), the Air Force will implement an adaptive management approach to basing the F-35 aircraft and standup of the JSF Initial Joint Training Site (IJTS). Adaptive management allows for improving an understanding of complex, interrelated systems through a long-term process built around a continuous cycle of experimentation, evaluation, learning, and improvement over time. The ability to experiment and test hypotheses in a time frame that allows meaningful data to be gathered and evaluated is an important element of that process. The

Table 2-19. Potential Mitigations or Management Measures, Cont'd

Resource Area/ Alternative	Mitigations or Management Measures

	area around Eglin AFB is a dynamic system that is continually evolving: it is likely that there will be unanticipated changes in baseline conditions, that new information may become available, or that the effectiveness of mitigation measures may be different than expected. Adaptive management techniques are well suited to such circumstances.
	
	Some adaptations may require additional NEPA analysis, such as those that would result in a substantial change to the action. Thus, the post-Record of Decision (ROD) mitigation plan will include an adaptive management program incorporating (for example) the following kinds of adaptive management approaches:
	
	• Noise modeling: Supplement existing data with new noise data as it is being developed in the future. Use new data to reveal and understand the potential effects of activities or practices that are underway or being considered for implementation in the F-35 IJTS ramp up to final operational capability and thereafter. Make changes to improve mitigations and related actions.
	• Management and oversight: Monitor and evaluate results of earlier predictions. Develop and implement adaptations to eliminate or reduce effects. Specific aspects of flying at Eglin AFB that will be regularly re-examined include, but are not limited to:
	  • Modify ground tracks used by aircraft to avoid noise-sensitive areas to a greater degree.
	  • Modify altitude, engine power setting, and airspeed profiles used by the JSF to reduce impacts to noise-sensitive areas.
	  • Modify the JSF training plan, as more experience is gained with training pilots on the JSF, to minimize any training event requirements that are not absolutely necessary for pilot combat readiness.
	  • Noise impacts may be reduced with the construction of an ILS and precision approach radar on any newly constructed runways. However, conducting routine instrument approaches to Eglin Main RW 12 would have a significant impact on Air Force Special Operations Command (AFSOC) operations and the usage of Restricted Area R-2915A.
	• New knowledge and information: Through experimentation, knowledge and information can be incorporated into management options and recommendations.
	
	The following additional steps will also be part of the mitigation plan for the selected Alternative:
	
	• Identifying the type of monitoring for the action and each mitigation
	• Delineating how the monitoring will be executed

Table 2-19. Potential Mitigations or Management Measures, Cont'd

Resource Area/ Alternative	Mitigations or Management Measures
	• Identifying who will fund and oversee its implementation • Establishing the process and responsibilities for identifying and making changes to the action or mitigations to influence beneficial results or avoid/reduce adverse ones
Land Use	
1A **1I** **2A** **2B** **2C** **2D** **2E**	Because most of the potential impacts to land use are directly related to noise from the F-35 flight operations, please see mitigations related to noise. These mitigations may help ensure that incompatible land use impacts are mitigated as well. No specific land use mitigations have been identified at this time. However, should appropriate mitigations be identified through the adaptive management process the Air Force may choose to implement them at that time.
Socioeconomics	
1A **1I** **2A** **2B** **2C** **2D** **2E**	Because most of the potential impacts to socioeconomics are directly related to noise from the F-35 flight operations, please see Section 4.3.4 for mitigations related to noise. These mitigations may help ensure that impacts to socioeconomics are mitigated as well. No specific socioeconomics mitigations have been identified at this time. However, should appropriate mitigations be identified through the adaptive management process, the Air Force may choose to implement them at that time.
Transportation	
1A **1I** **2A** **2B** **2C** **2D** **2E**	The demand on several roadways equates to the need for six lanes or more. However, an improvement for six lanes or more may not be feasible for many reasons, including right-of-way availability, safety concerns, cost, etc. Other improvements that should be considered include Congestion Management System (CMS) and Transportation System Management (TSM) projects, a corridor management plan that looks at access along the corridor, and transit improvements.

Table 2-19. Potential Mitigations or Management Measures, Cont'd

Resource Area/ Alternative	Mitigations or Management Measures
Utilities	
1A 1I 2A 2B 2C 2D 2E	No Mitigations
Air Quality	
1A 1I 2A 2B 2C 2D 2E	No Mitigations
Health and Safety	
1A 1I 2A 2B 2C 2D 2E	No Mitigations
Solid Waste	
1A 1I 2A 2B 2C 2D 2E	No Mitigations

Table 2-19. Potential Mitigations or Management Measures, Cont'd

Resource Area/ Alternative	Mitigations or Management Measures
Hazardous Materials	
1A **1I** **2A** **2B** **2C** **2D** **2E**	No Mitigations
Physical Resources	
1A **1I** **2A** **2B** **2C** **2D** **2E**	To minimize the potential for impacts to groundwater, wetlands floodplains, and other surface water resources in interstitial areas, the following management requirements would be employed: • Do not alter natural flow patterns of streams by diverting water, causing siltation, or damming any portion of the stream or its tributaries. • Vehicles and equipment must stay a minimum of 50 meters (164 feet) from the edge of slopes leading down to streams. • For permitted off-road vehicle use: Do not drive vehicles in or across streams except at designated crossing points. • Tree clearing of any species is not permitted unless approved by Eglin's Natural Resources Section (NRS). • Install and maintain entrenched silt fencing and hay bales along the perimeter of the construction site prior to any ground-disturbing activities and maintain them in effective, operating condition prior to, during, and throughout the entire construction process to prevent fill material, pollutants and runoff from entering wetlands or other surface waters. • Maintain at least a 100-foot vegetated buffer between construction sites and surface waters. • Incorporate a monitoring plan, especially after rain events, to observe the effectiveness of silt fencing, hay bales, and/or other erosion and sedimentation control devices and address modification as needed. Any failures would be carefully examined and corrected to prevent reoccurrence. • Sequence construction activities to limit the soil exposure for long periods of time. • Vegetate cleared/disturbed areas with native vegetation and grasses or mulch when the final grade is established to reduce/prevent erosion. • Where applicable, reduce erosion using rough grade slopes or terrace slopes. • Identify areas of existing vegetation that the proponent would retain and not disturb by construction activities.

Table 2-19. Potential Mitigations or Management Measures, Cont'd

Resource Area/ Alternative	Mitigations or Management Measures
	• Chemicals, cements, solvents, paints, or other potential water pollutants would be stored in locations where they cannot cause runoff pollution. • Any repairs, maintenance, and use of construction equipment (i.e., cement mixers) would take place in designated "staging areas" designed to contain any chemicals, solvents, or toxins from entering surface waters. • Stabilize construction site entrance using Florida Department of Transportation (FDOT)-approved stone and geotextile (fiber fabric). • Incorporate 10-year storm events into the design of facilities. • Do not utilize septic tanks. • Equip all work sites with adequate waste disposal receptacles for liquid, solid, and hazardous wastes to prevent construction and demolition debris from leaving the work site. • Utilize proper site planning, low-impact design principles, and adequately engineered stormwater retention ponds (or swales) to manage stormwater (on-site) and prevent discharges into nearby surface waters. The design would take into consideration the landscape of the area and physical features to determine whether a retention pond or series of swales would be used to contain runoff. In accordance with Florida Department of Environmental Protection (FDEP) regulations, a Florida-registered Professional Engineer would design the proposed retention feature. • Incorporate into the design and construction of paved surface areas a slope sufficient enough to direct potential runoff away from wetland areas. Design and construct all drainage improvements and related infrastructure in such a manner that the natural hydrologic conditions would not be severely altered. • Do not use wetlands and other water bodies as sediment traps. • Design open channels and outfall ditches to include plans so that they do not overflow their banks. • Where flow velocities exceed 2 cubic feet per second, provide ditch pavement or other permanent protection against scouring. Revegetate all ditches not protected with a permanent material to provide an erosion resistant embankment. • Treat runoff from parking lots to remove oil and sediment before it enters receiving waters. • Provide all construction personnel with proper training regarding all management techniques.

Table 2-19. Potential Mitigations or Management Measures, Cont'd

Resource Area/ Alternative	Mitigations or Management Measures
Biological Resources	
1A 1I 2A 2B 2C 2D 2E	There are existing operating constraints based on current agreements with the U.S. Fish and Wildlife Service (USFWS) for threatened and endangered (T&E) species protection. Additionally, all Terms and Conditions resulting from the current BRAC Section 7 consultation with the USFWS will be implemented. • Immediately prior to clearing, conduct surveys for gopher tortoises and indigo snakes. If any animals are found relocate them to another area on Eglin according to Florida Fish and Wildlife Conservation Commission (FWC) guidelines. • Provide project personnel with a description of the eastern indigo snake, including information on its behaviors, its protection under federal law, and instructions not to injure, harm, or kill this species. • Direct personnel to cease any activities if a black bear, indigo snake, or gopher tortoise is sighted and allow the animal sufficient time to move away from the site on its own before resuming any activities. Immediately contact Eglin's NRS. • Discourage human-bear interactions by responsibly handling waste and employing measures such as bear-proof dumpsters and bear-resistant garbage cans. • Restrict vehicles to established roads and paved areas. • Maintain at least a 100-foot vegetated buffer along Okaloosa darter and Florida bog frog streams. • Utilize erosion control measures such as silt fencing near Okaloosa darter stream and Florida bog frog streams. • To reduce potential seed sources, treat areas with known invasive nonnative species problems. • To avoid spreading invasive nonnative species, do not drive vehicles in areas with known invasive nonnative species problems. If a vehicle is driven in such an infested area, clean the vehicle before it is driven to a noninfested area. • Use only native plants for landscaping. • Restrict low-level aircraft flights within 1,000 feet (vertically) of the eagle nest on Eglin Main Base during the breeding season (October 1 to May 15). • Develop wildfire operational plans with Eglin's NRS to identify high wildfire risk conditions and notification procedures that units would follow to engage fire response personnel when needed. • Follow Eglin's Wildfire Specific Action Guide Restrictions (U.S. Air Force, 2006a). • Continue monitoring of red-cockaded woodpeckers (RCWs) in the area by Eglin's NRS.

Table 2-19. Potential Mitigations or Management Measures, Cont'd

Resource Area/ Alternative	Mitigations or Management Measures
	• If tree clearing were to occur during nesting season, screen each inactive cavity tree during the breeding season to verify no trees have been recolonized. • Continue prescribed burning as much as possible in RCW foraging habitat. • Minimize the placement of targets on sloped areas.
Cultural Resources	
1A 1I 2A 2B 2C 2D 2E	The Air Force would incorporate protection or mitigation measures provided through an amended National Historic Preservation Act (NHPA) Section 106 project-specific amended programmatic agreement (refer to Appendix F, *Cultural Resources*), which generally includes the following: • Use highly visible avoidance measures, such as flagging, tree or vegetation planting, temporary fencing, removable barriers, signage or gating and permanent barriers around the recorded limits of cultural sites. • Map the location of all archaeological sites and historic buildings and describe avoidance measures for each. • Coordinate with user groups to communicate the importance of protecting cultural resources and how to identify and avoid impacting them. This includes determining what markings, maps, briefings would be most effective to ensure avoidance of historic properties. • Data recovery, architectural treatment, or alternative mitigation methods conducted by a qualified individual and coordinated with the State Historic Preservation Officer (SHPO). The amended project-specific programmatic agreement would also specify measures to protect historic structures, which generally includes the following: • Address anticipated adverse effects of demolition by updating appropriate forms, compiling electronic photos and blueprints, and communicating with the public. • Accomplish all demolition using qualified individuals and coordinate directly with the SHPO. • Avoid and preserve in-place, whenever possible, all archaeological sites that are either determined to be or potentially be eligible for listing on the National Register of Historic Places (the NRHP), or follow the appropriate stipulations and procedures to resolve adverse effects. • If, as a result of aircraft noise, Eglin proposes to change the use of buildings that contribute to or are NRHP-eligible structures, determine whether the structure serves its historic purpose and whether the use is important to its significance. If both criteria are met, consult with SHPO and possibly enter into a Memorandum of Agreement regarding treatment of adverse effect.

2.6.3 Unavoidable Impacts

Certain JSF beddown activities are projected to result in disturbance and/or noise within areas not previously or recently subject to these effects. To the extent possible, mitigation measures would be applied to reduce potential effects to acceptable levels. However, some impacts that cannot be mitigated would occur. Some of these impacts could be considered adverse or annoying to potentially affected individuals. It should be noted that unavoidable impacts associated with noise initiated by JSF flight training activities in SUA as described in the FEIS are incorporated by reference.

Potential impacts that could occur and cannot be mitigated include the following:

- A number of noise-sensitive receptors near Eglin would be exposed to time-averaged noise levels (DNL) higher than are recommended per DoD compatible land use guidelines. Mitigation of interior noise at certain DoD facilities is possible, but it would be expensive and/or impossible to mitigate certain other facilities. The DoD is only currently authorized to fund on-base facility noise attenuation. Impacts would include annoyance and activity interruption.
- Noise from flight training operations around Eglin Main and Duke Field would have the potential to have a disproportionate adverse impact on affected minority and low-income populations. These flight operations would also have the potential to present a special risk to children as there are several schools and daycares that would be affected by these noise levels. Outdoor noise from overflights typically can only be mitigated through operational changes. All land uses have some outdoor component. The increased noise levels will result in a large increase in the numbers of highly annoyed persons and an impact on children's learning.
- The existing capacity of regional landfills would be reduced due to the solid waste generated.
- Hazardous and nonhazardous waste would be generated as a result of maintenance functions associated with new training units on the base.
- Munitions fragments and metallic residues would be generated and deposited on the Eglin Range as a result of training missions.
- Individual species would be affected by land clearing, construction, daily cantonment operations, air operations, munitions use, and pyrotechnics use.
- Stormwater runoff and associated erosion would increase due to construction.
- The level of service (LOS) on a number of roadway segments would deteriorate further.
- There is potential for an increase in the number of bird/wildlife-aircraft strikes and aircraft mishaps for all aircraft at the base resulting from the increased number of annual sorties.

This page is intentionally blank.

3. AFFECTED ENVIRONMENT

3.1 INTRODUCTION

For each environmental resource analyzed in this Supplemental Environmental Impact Statement (SEIS), Chapter 3 defines the resource; describes its potentially affected region of influence (ROI); explains its analysis methodology; lists its relevant regulatory requirements; and describes the existing conditions for that resource.

All alternatives discussed in this SEIS would have the same ROI for flight operations. Munitions training on Eglin Range would be common to all alternatives, as well.

The analysis methodology addresses both the context of the environmental resource and the intensity of potential consequence to the resource resulting from the Proposed Action. More technical methodology data and explanation are provided in Appendices for some environmental resources.

For this SEIS, as described in Section 2.1, the existing conditions effectively are the consequences associated with the No Action Alternative; thus, those consequences are presented as the existing conditions in Chapter 3 for each affected resource. In some cases, an affected resource has existing conditions that differ among alternatives. In those cases, the alternative-specific existing conditions are described within the resource analysis sections in Chapter 4.

3.2 AIRSPACE

3.2.1 Definition

Airspace management is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical borders of the United States and its territories. "Navigable airspace" is airspace above the minimum altitudes of flight prescribed by regulations under United States Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft (49 USC 40102). Congress has charged the Federal Aviation Administration (FAA) with responsibility for developing plans and policy for the use of the navigable airspace and with responsibility for assigning by regulation or order the use of the airspace necessary to ensure the safety of aircraft and their efficient use (49 USC 40103(b); FAA Order 7400.2).

3.2.2 Background

Since the original Draft SEIS was published in September 2010, planned utilization of the regional airspace by the Joint Strike Fighter (JSF) has changed, based on recommendations of the Gulf Regional Airspace Strategic Initiative (GRASI). Accordingly, this SEIS reflects the changes in airspace use (Section 1.2.6).

The GRASI began in 2008 as a result of increasing airspace use in the Gulf region. The GRASI's purpose was to bring all military and civilian aviation stakeholders together to plan how to share the airspace.

Using computer modeling and input from stakeholders, the GRASI determined that after the Base Realignment and Closure (BRAC) beddown and known expansion of other missions, the total requests for special use airspace (SUA) would exceed the available capacity in some areas (U.S. Air Force, 2011a). As a result, the GRASI working group devised strategies to integrate all military and civilian requirements. These strategies were finalized in March 2011 and include modifications to Air Traffic Control procedures, changes in SUA usage, and methods for improving schedule coordination (U.S. Air Force, 2011a).

3.2.3 Region of Influence

Both civilian and military airfields share the regional airspace, which drives the economy of northwest Florida. To protect this valuable resource, efficient management and safety are crucial. Mismanagement could result in the unavailability of the airspace, which could threaten military missions and impede civilian flight access to regional airports, hurting tourism and other regional business.

To maintain safety, various SUA units have been created in conjunction with the FAA to separate military flights from nonparticipating aircraft. SUA vertical and horizontal boundaries are defined in FAA orders, flight sectional maps, the U.S. Code of Federal Regulations (CFR), and Department of Defense (DoD) Flight Information Publications (FAA, 2012). Additionally, SUA controlled by Eglin is detailed in Eglin Air Force Base Instruction (EAFBI) 11-201, *Flying Operations.* SUA units include but are not limited to the following:

- Restricted areas
- Warning areas
- Military operating areas

Regionally, restricted areas are located primarily over the land portion of the Eglin Reservation. The restricted areas such as R-2914/R-2915/R-2919 are primarily used by various military tenants for extensive multi-use air-to-surface, surface-to-air, ground detonations, and test and evaluation activities. JSF aircraft could also use R-4401 A/B located over the Camp Shelby Range and managed by the Mississippi Air National Guard (MSANG).

Warning areas are similar to restricted areas but are located over the water portion of the Eglin Gulf Test and Training Range (EGTTR). Warning Area W-151 is principally used for broad multi-use air-to-air, air-to-surface, and surface-to-air training activities, aircraft flying activities, and test and evaluation activities.

Warning Area W-470 is used mainly by the 325th Fighter Wing located at Tyndall Air Force Base (AFB) for training jet pilots in the F-22 aircraft. The Air Combat Maneuvering Instrumentation utilized in scoring pilot efficiency is located in this area. The 96th Operations Support Squadron schedules the airspace for Warning Area W-470.

Warning Area W-155 is managed by Naval Air Station (NAS) Pensacola and is used primarily by the Navy for pilot training and on occasion by training and test missions out of Eglin AFB.

Military operating areas (MOAs) in Florida, Alabama, Georgia, and Mississippi may also be used. In Alabama, Camden Ridge MOA is used mainly by the 187th Fighter Wing of the Air National Guard, and the Pine Hill East and West MOAs are used by the Commander, Training Air Wing One, from Meridian NAS. The Eglin MOAs and Rose Hill MOA are managed by Eglin's 96th Test Wing (96 TW). In Georgia, at Moody AFB, the "Moody 3" MOA is currently used by the Air Force's 23 Wing. In Mississippi, the Desoto I/II MOAs are primarily used by the MSANG. The Tyndall MOAs are used primarily by the 325th Operations Support Squadron, Wing Scheduling Division out of Tyndall AFB, Florida.

Military missions use other types of airspace not categorized as SUA but where limitations may still be imposed on nonparticipating aircraft. This type of airspace is slightly less restrictive than SUA, but its purpose is also to minimize negative interactions between a military mission and nonparticipating aircraft. For example, military training routes (MTRs) are low-altitude routes that permit flights to exceed a speed of 250 knots below 10,000 feet above ground level (AGL) (FAA, 2012). Nonparticipating aircraft may enter an MTR but should practice caution. MTRs can operate under visual rules (VR) or instrument rules (IR). MTRs examined in this SEIS include VR-1082, VR-1085, VR-1017, VR-1056, IR-17, and IR-31.

Figure 3-1 presents the location of these regional airspace units. Table 3-1 provides details on the existing regional airspace analyzed in the *Proposed Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions at Eglin AFB, FL Final Environmental Impact Statement, dated October 2008* (the FEIS) dated October 2008, the Draft SEIS, and the Revised Draft/Final SEIS.

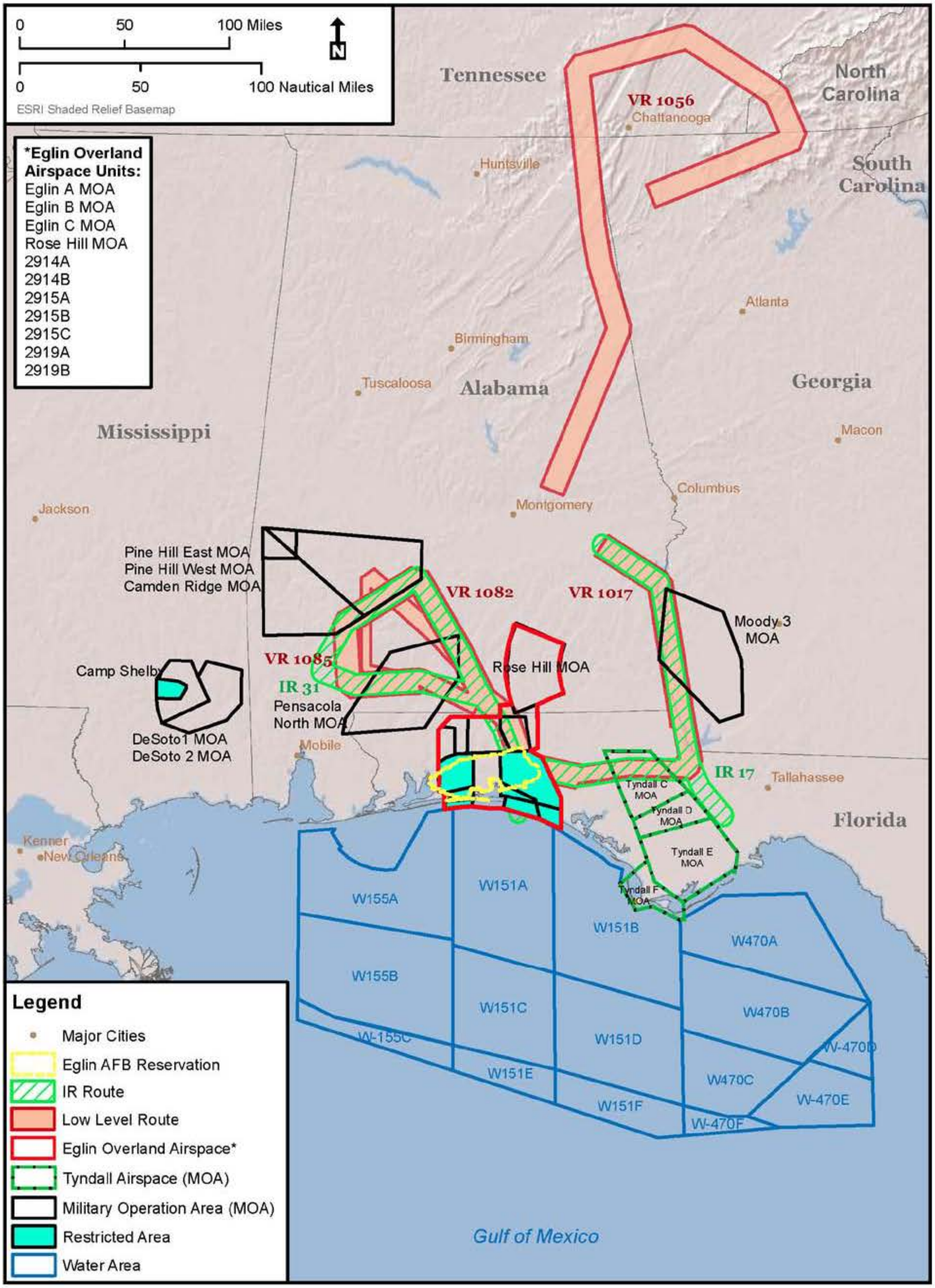


Figure 3-1. Location of Existing Regional Military Airspace Units

Table 3-1. Existing Regional Airspace

Airspace Type	Name	Floor	Ceiling	Analyzed in the FEIS	Analyzed in the Draft SEIS	Analyzed in the Revised Draft/Final SEIS
Restricted Areas	R-2914A	Surface	Unlimited	✓	✓	✓
	R-2914B	8,500 ft MSL	Unlimited	✓	✓	✓
	R-2915A	Surface	Unlimited	✓	✓	✓
	R-2915B	Surface	Unlimited	✓	✓	✓
	R-2915C	8,500 ft MSL	Unlimited	✓	✓	✓
	R-2919A	Surface	Unlimited	✓	✓	✓
	R-2919B	8,500 ft MSL	Unlimited	✓	✓	✓
	R-4401 A	Surface	4,000 ft MSL			✓
	R-4401 B	4,000 ft MSL	18,000 ft MSL			✓
Military Operating Areas	Eglin MOA-A	1,000 ft AGL	18,000 ft MSL	✓	✓	✓
	Eglin MOA-C	1,000 ft AGL	18,000 ft MSL	✓	✓	✓
	Rose Hill MOA	8,000 ft MSL	18,000 ft MSL			✓
	Tyndall MOA C/D	300 ft AGL	6,000 ft MSL	✓	✓	✓
	Tyndall MOA E/F	300 ft AGL	18,000 ft MSL	✓	✓	✓
	Camden Ridge	500 ft AGL	10,000 ft MSL			✓
	Pine Hill	10,000 ft MSL	18,000 ft MSL			✓
	Moody 3	8,000 ft MSL	18,000 ft MSL			✓
	Desoto I	500 ft AGL	10,000 ft MSL			✓
	Desoto II	100 ft AGL	5,000 ft MSL			✓
Warning Areas	W-151A	Surface	Unlimited	✓	✓	✓
	W-151B	Surface	Unlimited	✓	✓	✓
	W-151C	Surface	Unlimited	✓	✓	✓
	W-151D	Surface	Unlimited	✓	✓	✓
	W-151E	Surface	Unlimited	✓	✓	✓
	W-151F	Surface	Unlimited	✓	✓	✓
	W-155A	Surface	Unlimited			✓
	W-155B	Surface	Unlimited			✓
	W-470A	Surface	Unlimited			✓
	W-470B	Surface	Unlimited			✓
	W-470C	Surface	Unlimited			✓
Military Training Routes	VR-1082	Surface	1,500 ft AGL	✓	✓	✓
	VR-1085	Surface	1,500 ft AGL	✓	✓	✓
	VR-1017	Surface	1,500 ft AGL		✓	✓
	VR-1056	Surface	1,500 ft AGL		✓	✓
	IR-17	Surface	1,500 ft AGL			✓
	IR-31	Surface	1,500 ft AGL			✓

AGL = above ground level; BRAC = Base Realignment and Closure; FEIS = *Proposed Implementation of the BRAC 2005 Decisions and Related Actions at Eglin AFB, FL, Final Environmental Impact Statement* (U.S. Air Force, 2008a); ft = feet; IR = instrument route; MOA = military operating area; MSL = mean sea level; R = Restricted Area; SEIS = Supplemental Environmental Impact Statement; VR = visual route; W = Warning Area

3.2.4 Analysis Methodology

This SEIS incorporates the following recommendations from the GRASI report (U.S. Air Force, 2011a):

- **Utilization of additional SUA:** Additional non-Eglin airspace was incorporated to expand training opportunities. SUA units evaluated include Camden Ridge/Pine Hill, Carabelle East/West, Compass Lake, Desoto/R-4401, W-155, and Moody AFB (Table 1-2).
- **Relocation of some simulated flameout operations:** Simulated flameout approaches have been shifted from Eglin Main Base and Duke Field to Choctaw Field and Tyndall AFB to improve airspace in the North/South corridor.
- **Creation of four new Air Traffic Control assigned airspaces (ATCAAs):** Four new ATCAAs are currently being established.
- **Efficient use of airspace over R-2914 and R-2915:** This recommendation involves utilizing a new scheduling tool that would track and compare scheduled airspace with airspace actually utilized, in order to increase efficiency and allow for more flexibility.

3.2.5 Laws and Regulations

The Air Force manages airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201, *Air Force Airspace Management*. AFI 13-201 implements Air Force Planning Directive (AFPD) 13-2, *Air Traffic Control, Airspace, Airfield, and Range Management*, and DoD Directive 5030.19, *DoD Responsibilities on Federal Aviation and National Airspace System Matters*. The AFI 13-201 addresses the development and processing of SUA and covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support Air Force flight operations. AFI 13-204, *Functional Management of Airfield Operations,* also implements AFPD 13-2 and directs the management of Air Force Air Traffic Control and airfield management functions, personnel, and facilities. EAFBI 11-201, *Air Operations*, implements aircraft rules and procedures that apply to all air operations at Eglin AFB, auxiliary fields (with the exception of Choctaw Field, as its airspace is managed by the Pensacola Tracon), and test areas within the EGTTR. In addition to the above-referenced AFIs and EAFBIs, the Air Force utilizes FAA Order 7110.65R, *Air Traffic Control*, and FAA Order 7610.4, *Memorandum of Agreement between Department of the Air Force and Federal Aviation Administration on Safety for Space Transportation and Range Activities*.

3.2.6 No Action Alternative Consequences

JSF flight training operations associated with the No Action Alternative would impact air traffic controller workload and would contribute to increased congestion (air and ground delays) for military and civilian aircraft across the region. However, it is anticipated that a number of the GRASI recommendations would enhance Air Traffic Control flexibility and decision making to relieve some of the burden on air traffic controllers (U.S. Air Force, 2011a).

3.3 NOISE

3.3.1 Definition

Noise is defined as unwanted sound. Potential noise impacts are dependent on characteristics of the noise such as sound level, pitch, and duration. Noise impacts are also strongly influenced by characteristics of the noise receiver (i.e., persons, animals, or objects that hear or are affected by noise). Annoyance, speech interference, sleep disturbance, human health effects (auditory and nonauditory), wildlife impacts, and structural damage are all issues subjected to analysis of potential noise impacts. Additional discussion of specific noise effects on other affected resources can be found in Section 3.4 (*Land Use*), Section 3.5 (*Socioeconomics and Environmental Justice*), Section 3.13 (*Biological Resources*), and Section 3.14 (*Cultural Resources*). Appendix E, *Noise*, presents information on noise metrics and describes methods used to model aircraft and munitions noise levels.

Because both the duration and frequency of noise events also play a role in determining overall noise impact, several metrics are used that account for these factors. Each metric discussed below is used in the assessment of noise impacts in this SEIS. A more thorough explanation of these metrics can be found in Chapter 3 and Appendix E, *Noise*, of the FEIS.

- A-weighted decibel (dBA) sound level measurements reflect the frequencies to which human hearing is most sensitive. Noise levels can be assumed to be A-weighted unless a different weighting is specified.
- Day-night average sound level (DNL) represents aircraft noise level averaged over a 24-hour period with a 10-decibel (dB) penalty to flights occurring between 10:00 PM and 7:00 AM to account for the added intrusiveness of noise during these hours.
- Sound exposure level (SEL) accounts for both the maximum sound level and the length of time a sound lasts.
- Equivalent sound level (L_{eq}) represents aircraft noise level averaged over a specified time period. This analysis uses a 1-hour L_{eq} to quantify expected noise levels in each of the hours of a school day (i.e., each 1-hour increment between 7:00 AM and 4:00 PM).

- Maximum sound level (L_{max}) is the highest sound level measured (using time integration of either 1/8 second or 1 second) during a noise event. L_{max} decreases as altitude or distance from the observer increases and varies according to the type of aircraft, airspeed, and power setting.
- Peak Noise Exceeded by 15 Percent of Firing Events, or PK_{15}(met), accounts for weather-influenced statistical variation in received single-event peak noise levels, such as with munitions use. This metric is not frequency-weighted.
- C-weighted day-night average sound level (CDNL) is the 24-hour day-night averaged C-weighted sound level computed for areas subjected to sonic booms and blasts from high explosives.
- Onset-rate adjusted monthly day-night average sound level (L_{dnmr}) is the measure used for subsonic aircraft noise in military airspace (ranges, MTRs, MOAs, or warning areas).

3.3.2 Region of Influence

The ROI for noise includes Eglin Main Base, Duke Field, Choctaw Field, and the areas surrounding these installations, as well as land areas included within the Eglin Range Complex and other airspace units where F-35 training would occur. Individual alternatives would utilize varying combinations of runways for F-35 basing and flying operations. The same airspace units would be utilized under all of the alternatives. Noise environments in the vicinities of Eglin Main Base, Duke Field, and Choctaw Field are dominated by aircraft noise and munitions activities. Other noise sources on the installations include ground vehicles, ongoing construction activities, and machinery.

3.3.3 Analysis Methodology

The F-35A is the only aircraft available for obtaining measurements for the NOISEFILE database, which is used by NOISEMAP 7 to predict noise levels. Since noise source data for the F-35B and F-35C variants are not currently available, noise modeling for all three F-35 variants is based on the noise levels from the F-35A measured at Edwards AFB in April 2008. Noise from F-35B and F-35C operations are approximated by using the existing F-35A noise source data with F-35B and F-35C variant-specific adjustments for aircraft speed, power, altitude, and time in mode to reflect various operations. Flight profiles expected to be flown by both the F-35B and F-35C variants were also used in the modeling process. Additional operational data were collected from pilots, air traffic controllers, aircraft maintainers, range operators, and other sources in accordance with standard data collection procedures.

When the Air Force is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement (EIS) and there is incomplete or unavailable information that is essential to a reasoned choice among the alternatives, Council on Environmental Quality (CEQ) regulations at 40 CFR 1502.22 allow environmental impact analysis, under certain circumstances, to employ existing data that are relevant to evaluating the reasonably foreseeable significant impacts using methods generally accepted in the scientific community.

Even though the Air Force does not believe that 40 CFR 1502.22 is triggered, the rationale for not waiting for more complete data and the approach taken to model F-35B and F-35C noise impacts are consistent with 40 CFR 1502.22. While the measured data for the F-35B and F-35C models are not currently available, the results of the current modeling are consistent with the generally accepted approach in the scientific community and provide sufficient information to estimate the noise from the F-35B and F-35C models. When the noise source data are available, the Air Force will determine whether additional environmental analysis is required.

The data were input to computerized noise models to generate estimates of noise levels. Each of the following noise models was applied as appropriate for each type of noise:

- NOISEMAP (Version 7.32) – Aircraft noise levels in the vicinity of runways were calculated and are presented using the DNL metric.
- MR_NMAP – Aircraft operations noise levels beneath military airspace units were calculated using the L_{dnmr} metric.
- BOOMAP – Sonic booms associated with the proposed F-35 training were calculated using the CDNL metric.
- RCNM – The DNL noise metric was used to estimate effects of construction noise.

Potential Hearing Loss (PHL)

Noise impacts could include annoyance, activity interruption, hearing loss, and potentially nonauditory health effects. More information on the noise metrics described and impact assessment methodology in Section 3.3 can be found in the FEIS's Appendix E, *Noise*. Potential hearing loss (PHL) as a noise impact is introduced in this SEIS, and details describing PHL are included in this section.

There is very little potential for hearing loss at noise levels below 75 dB DNL (Committee on Hearing, Bioacoustics and Biomechanics [CHABA], 1977). However, there are situations where noise in and around airbases may exceed 75 dB DNL.

The first of these is a result of exposure to occupational noise by individuals working in known high noise exposure locations such as jet engine maintenance facilities or aircraft maintenance hangars. In this case, exposure of workers inside the base boundary area should be considered occupational, and is excluded from the DoD Noise Program by DoD Instruction 4715.13. This noise exposure should be evaluated using the appropriate DoD component regulations for occupational noise exposure. The DoD, U.S. Air Force, and the National Institute for Occupational Safety and Health all have established occupational noise exposure damage risk criteria (or "standard") for hearing loss so as to not exceed 85 dB as an 8-hour time weighted average, with a 3-dB exchange rate in a work environment. (The *exchange rate* is an increment of decibels that requires the halving of exposure time or a decrement of decibels that requires the doubling of exposure time. For example, a 3-dB exchange rate requires that noise exposure time be halved for each 3-dB increase in noise level. Therefore, an individual would achieve the limit for risk criteria at 88 dB for a time period of four hours, and at 91 dB for a time period of two hours.) The standard assumes "quiet" (where an individual remains in an environment with noise levels less than 72 dB) for the balance of the 24-hour period. Also, Air Force and Occupational Safety and Health Administration (OSHA) occupational standards prohibit any unprotected worker exposure to continuous (i.e., of a duration greater than one second) noise exceeding a 115-dB sound level. OSHA established this additional standard to reduce the risk of workers developing noise-induced hearing loss.

The second situation where individuals may be exposed to high noise levels is when noise contours resulting from flight operations in and around the installation reach or exceed 80 dB DNL both on- and off-base. To help determine the potential impacts of this situation, DoD published a policy for assessing hearing loss risk (DoD, 2009a). The policy defines the conditions under which assessments are required, references the methodology from a 1982 U.S. Environmental Protection Agency (USEPA) report, and describes how the assessments are to be calculated; the policy states:

> Current and future high performance aircraft create a noise environment in which the current impact analysis based primarily on annoyance may be insufficient to capture the full range of impacts on humans. As part of the noise analysis in all future environmental impact statements, DoD components will use the 80 Day-Night A-Weighted (DNL) noise contour to identify populations at the most risk of potential hearing loss (PHL). DoD components will use as part of the analysis, as appropriate, a calculation of the PHL of the at risk population. The PHL (sometimes referred to as Population Hearing Loss) methodology is defined in [US]EPA Report No. 550/9-82-105, Guidelines for Noise Impact Analysis.

The USEPA *Guidelines for Noise Impact Analysis* (hereafter referred to as "USEPA Guidelines") specifically address the criteria and procedures for assessing noise-induced hearing loss in terms of the Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise (USEPA, 1982). Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kilohertz that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the *Average NIPTS*. The Average NIPTS attributable to noise exposure for ranges of noise levels in terms of DNL is given in Table 3-2.

For a noise exposure within the 80–81 dB DNL contour band, the expected lifetime average value of NIPTS (hearing loss) is 3.0 dB. The Average NIPTS is estimated as an average over all of the people included in the at-risk population. The actual value of NIPTS for any given person will depend on their physical sensitivity to noise; some will experience more loss of hearing than others. The USEPA Guidelines provide information on this variation in sensitivity in the form of the NIPTS exceeded by 10 percent of the population, which is included in Table 3-2 in the "10th Percentile NIPTS" column. As in the example above, for individuals within the 80–81 dB DNL contour band, the most sensitive of the population would be expected to show no more degradation to their hearing than experiencing a 7.0 dB hearing loss. And while the DoD policy requires that hearing loss risk be estimated for the population exposed to 80 dB DNL or greater, this does not preclude populations outside the 80 dB DNL contour, i.e., at lower exposure levels, from being at some degree of risk of hearing loss.

Table 3-2. Average NIPTS and 10th Percentile NIPTS as a Function of DNL[1]

DNL (dB)	Average NIPTS (dB)[2]	10th Percentile NIPTS (dB)[2]
80–81	3.0	7.0
81–82	3.5	8.0
82–83	4.0	9.0
83–84	4.5	10.0
84–85	5.5	11.0
85–86	6.0	12.0
86–87	7.0	13.5
87–88	7.5	15.0
88–89	8.5	16.5
89–90	9.5	18.0

dB = decibels; DNL = day-night average sound level; NIPTS = Noise-Induced Permanent Threshold Shift
1. Relationships between DNL and NIPTS were derived from Committee on Hearing, Bioacoustics and Biomechanics [CHABA], 1977.
2. NIPTS values rounded to the nearest 0.5 dB.

The actual noise exposure for any person living in the at-risk area is determined by the time that person is outdoors and directly exposed to the noise. Many of the people living within the applicable DNL contour will not be present during the daytime hours; they may be at work, at school, or involved in other activities outside the at-risk area.

Many will be inside their homes and thereby exposed to lower noise levels, benefiting from the noise attenuation provided by the house structure. The actual activity profile is usually impossible to generalize. For the purposes of this analysis, it was assumed that residents are fully exposed to the DNL level of noise appropriate for their residence location and the Average NIPTS taken from Table 3-2.

The quantity to be reported is the number of people living within each 1-dB contour band between 80 to 90 dB DNL who are at risk for hearing loss given by the Average NIPTS for that band. The average nature of Average NIPTS means that it underestimates the magnitude of the PHL for the population most sensitive to noise. Therefore, in the interest of disclosure, the information to be reported includes both the Average NIPTS and the 10th percentile NIPTS (Table 3-2) for each 1-dB contour band inside the 80 dB DNL contour.

According to the USEPA document titled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety and Public Health and Welfare Criteria on Noise*, changes in hearing level of less than 5 dB are generally not considered noticeable or significant. There is no known evidence that a NIPTS of less than 5 dB is perceptible or has any practical significance for the individual. Furthermore, the variability in audiometric testing is generally assumed to be ±5 dB. The preponderance of available information on hearing loss risk is from the workplace with continuous exposure throughout the day for many years. Clearly, this data is applicable to the adult working population.

According to a report by Ludlow and Sixsmith, there were no significant differences in audiometric test results between military personnel, who as children, had lived in or near stations where jet operations were based, and a similar group who had no such exposure as children (Ludlow and Sixsmith, 1999). Hence, for purposes of this PHL analysis, it is assumed that the limited data on hearing loss is applicable to the general population, including children, and provides a conservative estimate of hearing loss.

Number of Noise Events Analysis

Speech interference associated with aircraft noise is a primary cause of annoyance for many communities. The disruption of routine indoor activities such as watching television or listening to the radio, using the telephone or conversing gives rise to frustration and irritation. Several research studies since 1984 have concluded that if an aircraft noise event's loudest noise level (i.e., its L_{max}) reached no higher than 50 dB, then 90 percent of speech typically would be understood. If the L_{max} exceeds 50 dB indoors, then activity/speech disruption could occur to some degree.

The analysis of the number of events above an indoor L_{max} of 50 dB assumed that the average home built to modern building codes, in a "windows-closed" environment, provides 25 dB of attenuation from outdoor noise sources (noise level reduction). The total number of aircraft noise events that exceed the threshold L_{max} level of 50 dB inside a structure was determined for an average operating day (24-hour period). In this way, the result answers the question of how many aircraft might fly over a given location that may potentially result in some level of interruption of activities such as conversing or listening to television.

For all types of noise impacts, significance is determined based on the extent, context, and intensity of the impact in relation to relevant regulations, guidelines, and scientific documentation. Additional detail on noise analysis methodology can be found in Chapter 3 of the FEIS and this SEIS's Appendix E, *Noise*.

3.3.4 Laws and Regulations

There are no specific legal limits that apply to military aircraft noise. The Air Force participated in the Federal Interagency Committee on Urban Noise (FICUN) development of guidelines for compatibility of land uses with elevated noise levels.

3.3.5 No Action Alternative Consequences

Day-Night Average Sound Level (DNL)

Noise modeling was conducted to reflect projected F-35 aircraft operations under the No Action Alternative. In certain departure aircraft configurations (i.e., when a training mission requires the aircraft to depart while heavily loaded), JSF aircraft would be required to use the afterburner to ensure flight safety. Afterburner departures and aircraft operations occurring during "late night" (between 10:00 PM and 7:00 AM) contribute more to noise-related disturbance of affected populations than other types of operations. Table 3-3 shows aircraft operations and afterburner departures expected to occur under the No Action Alternative.

Table 3-3. Afterburner Departures and "Late Night" Flying Operations (10:00 PM – 7:00 AM) Under the No Action Alternative

Operation	Eglin Main		Duke Field		Choctaw Field	
	Afterburner	Late Night	Afterburner	Late Night	Afterburner	Late Night
Departures	17%	0%	0%	1%	0%	1%
Arrivals	n/a	3%	n/a	1%	n/a	1%
Closed Patterns	n/a	0%	n/a	1%	n/a	2%

Note: the numbers represented in the table are the percentage of total operations at each airfield.

Noise contours in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field under the No Action Alternative are depicted in Figure 3-2. Figure 3-3 depicts noise levels *in the vicinity of Eglin Main Base* under the No Action Alternative, and Figure 3-4 shows those noise levels compared with the 2006 Air Installation Compatible Use Zones

(AICUZ) study DNL noise contour lines. Acreage, population, and residential parcels affected by DNL noise contours associated with all aircraft (including the F-35 aircraft) at Eglin Main Base, Duke Field, and Choctaw Field under the No Action Alternative are shown in Table 3-4.

Table 3-4. Acreage, Population, and Residential Parcels Affected by Elevated Noise Levels Under the No Action Alternative

Noise Level (dB DNL)	Acres Off-Installation[1]				Acres On-Installation[1]	Off-Installation Population[2]				Residential Parcels
	Eglin	Duke	Choctaw	Total	Total	Eglin	Duke	Choctaw	Total	Total
65–70	373	1	1,233	1,607	10,458	988	1	2	991	413
70–75	237	0	836	1,073	12,125	635	0	0	635	226
75–80	83	0	59	142	4,518	174	0	0	174	53
80–85	0	0	0	0	2,483	0	0	0	0	0
>85	0	0	0	0	3,403	0	0	0	0	0
Total	**693**	**1**	**2,128**	**2,822**	32,986	**1,797**	**1**	**2**	**1,800**	**692**

> = greater than; Choctaw = Choctaw Field; dB = decibels; DNL = day-night average sound level; Duke = Duke Field; Eglin = Eglin Main Base

1. Acreage estimations do not include areas covered by water.
2. Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

Under the No Action Alternative, 693 acres and an estimated 1,797 persons could be exposed to noise levels exceeding 65 dB DNL *near* Eglin Main Base. In the vicinity of Duke Field, 1 acre and an estimated 1 person would be exposed to noise exceeding 65 dB DNL, and at Choctaw Field, 2,128 acres and 2 persons could be exposed to noise levels greater than 65 dB DNL.

There is an amount of unavoidable uncertainty associated with estimates of population impacted by elevated noise levels, as shown in Table 3-4. The method used to estimate number of persons affected is subject to some error. Off-installation residents were estimated by summing the populations of census blocks on land not owned by the Air Force that were affected by noise contours. Where census blocks were split by a noise contour line, population within the noise contour was assumed to be proportional to the percentage of the census block located within the noise contour interval. While this assumption is not always correct, the results would not be expected to be biased in favor of either more or less population being included in the estimate.

Table 3-4 also shows the number of residential parcels impacted by elevated noise levels in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field. Where residential parcels were split by a noise contour line, the parcel in the higher noise contour interval was counted. For example, if a parcel was split by the 70 dB noise contour line, that parcel was counted in the 70–75 dB (not 65–70 dB) noise contour interval. Residential parcel information was derived from data submitted by Okaloosa and Santa Rosa Counties to the Florida Department of Revenue for tax year 2009.

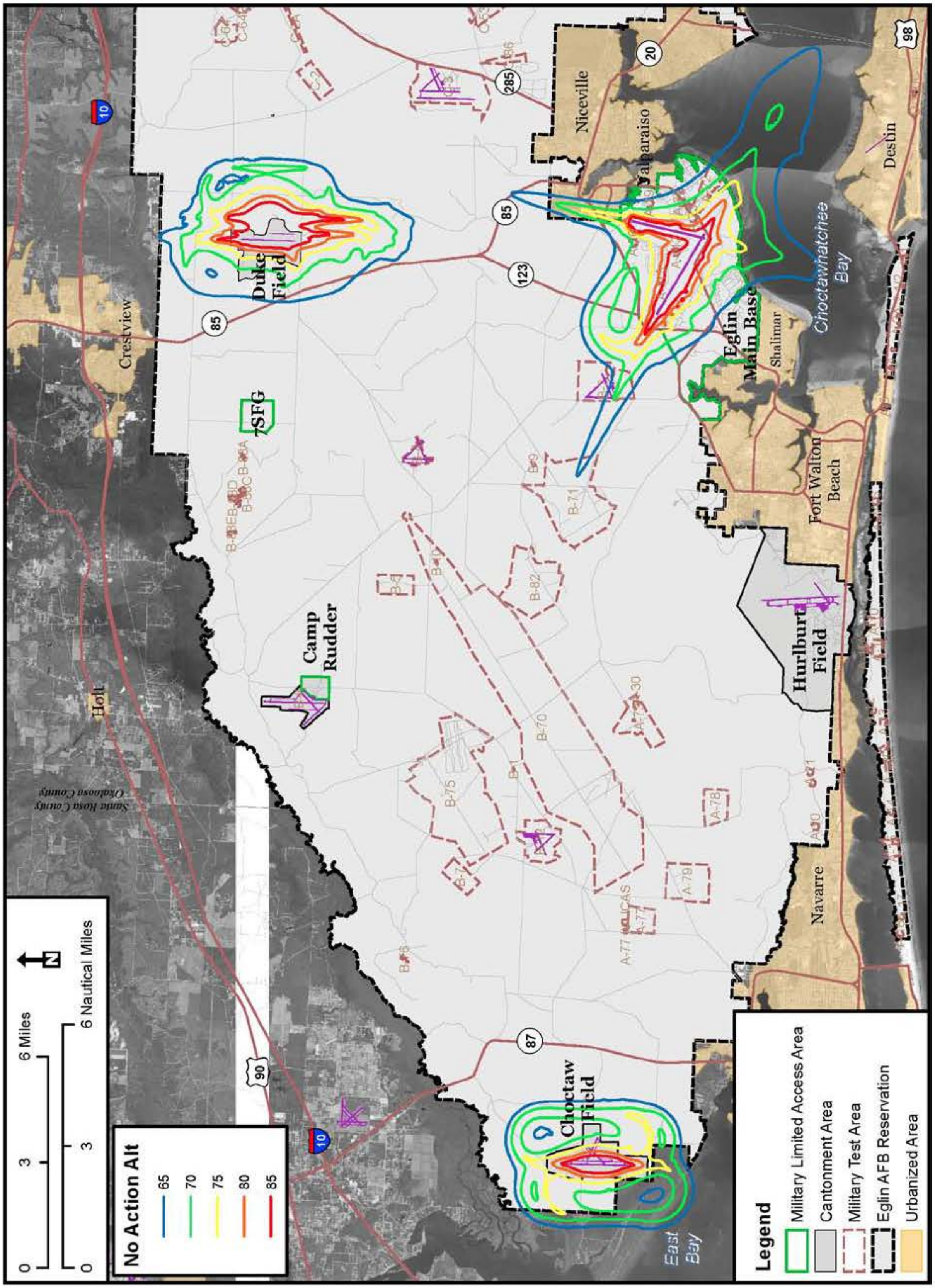


Figure 3-2. Noise Contours from F-35 and All Other Aircraft at Eglin Main, Duke Field, and Choctaw Field Under the No Action Alternative

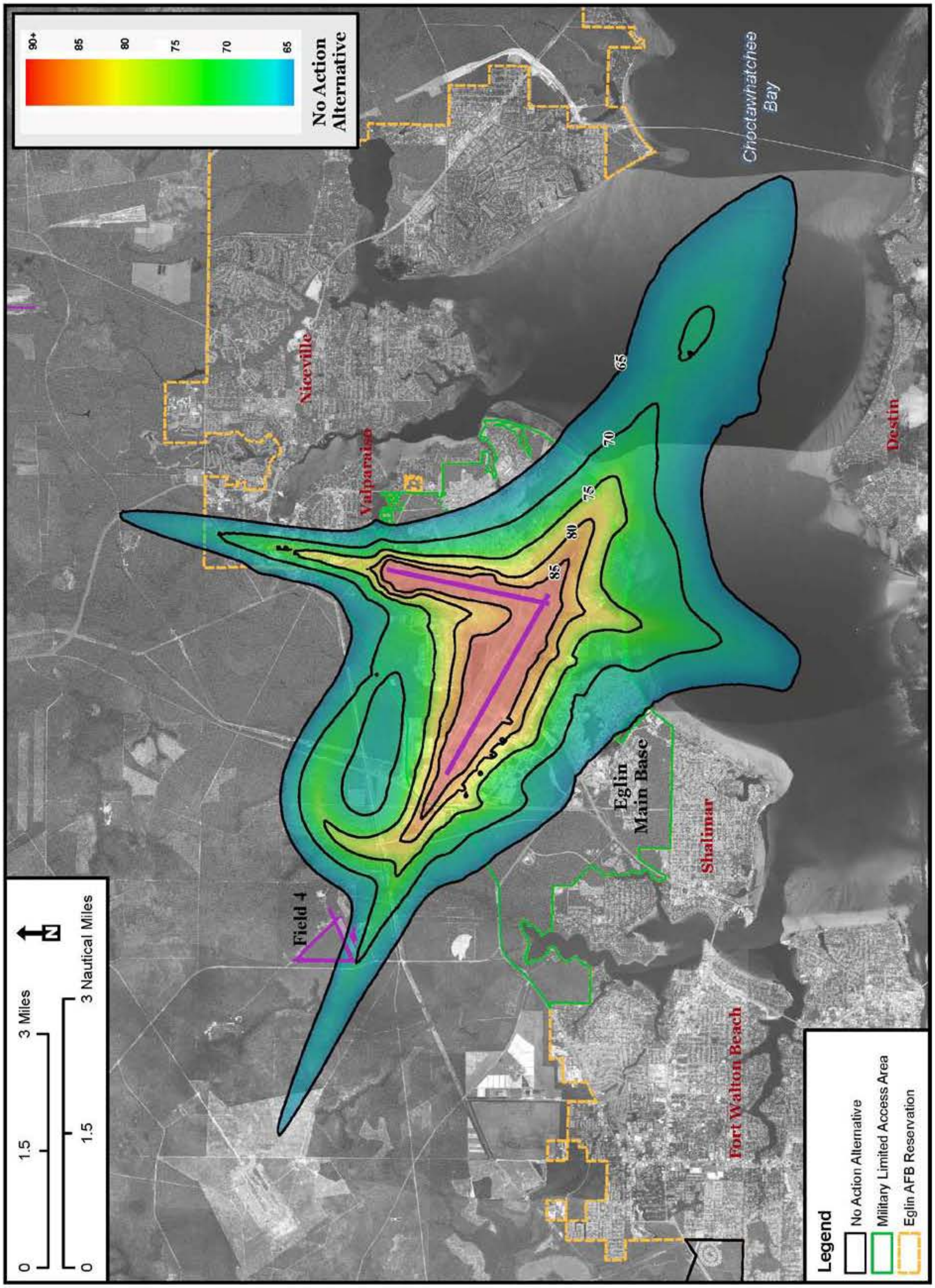


Figure 3-3. Noise Contours from F-35 and All Other Aircraft Under the No Action Alternative in the Vicinity of Eglin Main Base

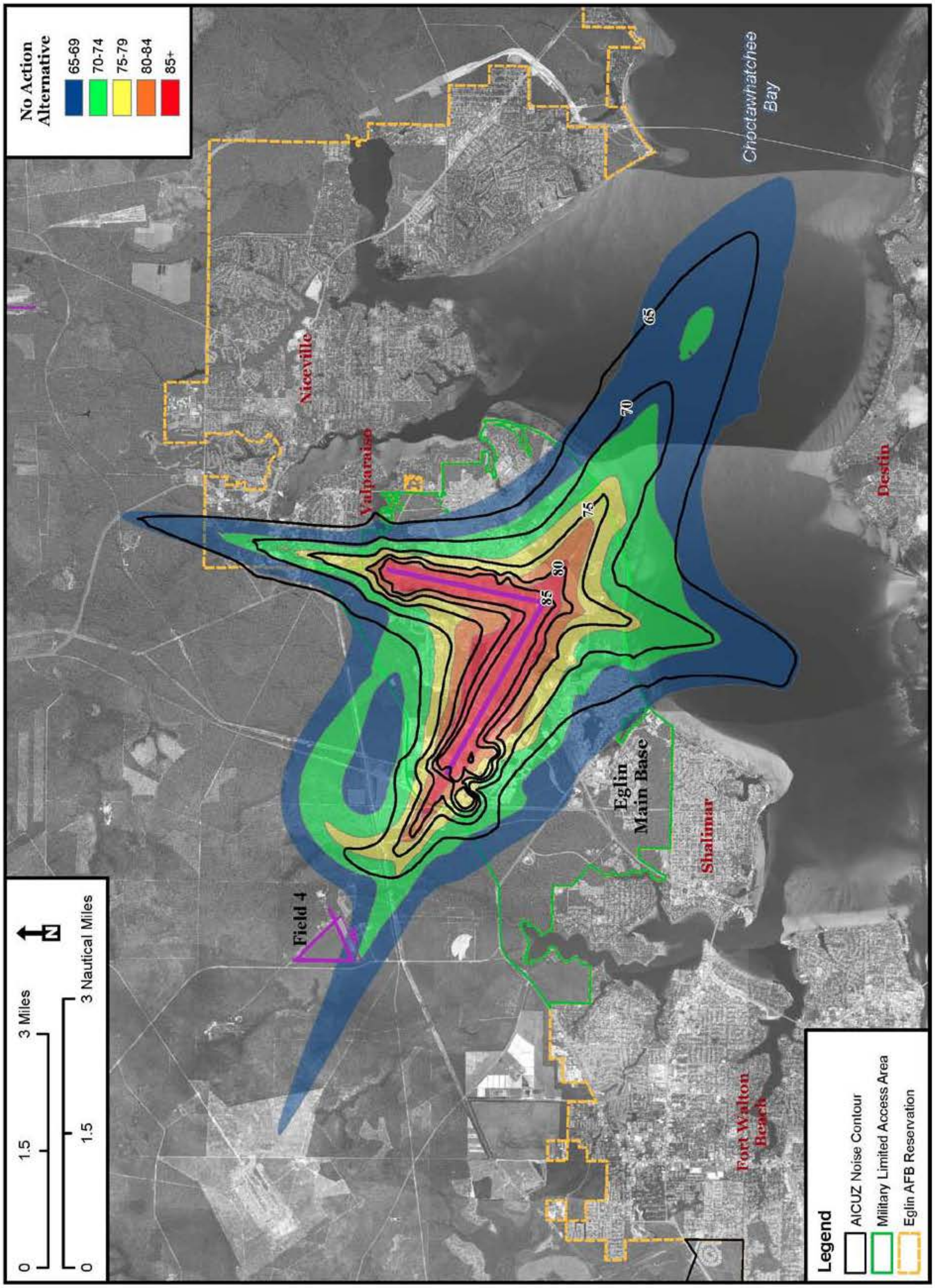


Figure 3-4. Noise Contours from 2006 AICUZ Study and F-35 and All Other Aircraft Under the No Action Alternative in the Vicinity of Eglin Main Base

Under the No Action Alternative, 134 buildings *on* Eglin Main Base would be impacted by noise greater than 80 dB DNL. On Duke Field and Choctaw Field, 75 buildings and 6 buildings, respectively, are estimated to be affected by noise greater than 80 dB DNL under the No Action Alternative. None of the affected on-base buildings include residential housing. This information will be used by bioengineering as a baseline to evaluate PHL in and around facilities. The bioengineering staff is evaluating actual noise impacts to on-base areas and is implementing policies and procedures in accordance with AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection and Health (AFOSH) Program*, in particular AFOSH Standard 48-20, *Occupational Noise and Hearing Conservation Program*.

Potential Hearing Loss (PHL)

PHL under the No Action Alternative was assessed using the methodology described above and in greater detail in Appendix E, *Noise*. Based on this assessment, it is estimated that no individuals in the vicinity of Eglin AFB would be exposed to aircraft noise 80 dB DNL or greater. Figure 3-5 shows PHL risk areas under the No Action Alternative.

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Representative noise-sensitive locations, including hospitals, schools, churches, administrative buildings, residential areas, a daycare, and a prison were selected for special noise analysis. Figure 3-6 shows where each point is located**.** Table 3-5 describes aircraft noise levels at each of the noise-sensitive locations using the time-averaged metric DNL and the single overflight noise metric SEL. At each noise-sensitive location, all of the flights in the NOISEMAP model were ranked based on their contribution to overall DNL noise level at that location.

Table 3-5 states the range of SEL values for the top 20 SEL contributors. “Top 20 SEL” refers to the range of SEL decibel noise levels generated by the 20 profiles that contribute most to overall DNL noise level at a given location. Refer to Appendix E, *Noise*, for tables that describe the top 20 profiles. Individual overflights at these locations may exceed the maximum SEL value of the range stated in Table 3-5. However, such overflights would not occur at sufficient frequency to contribute significantly to the overall noise level. Additional details regarding the overflights contributing most to overall noise levels at each of the sensitive receptors listed in Table 3-5 can be found in Appendix E, *Noise.*

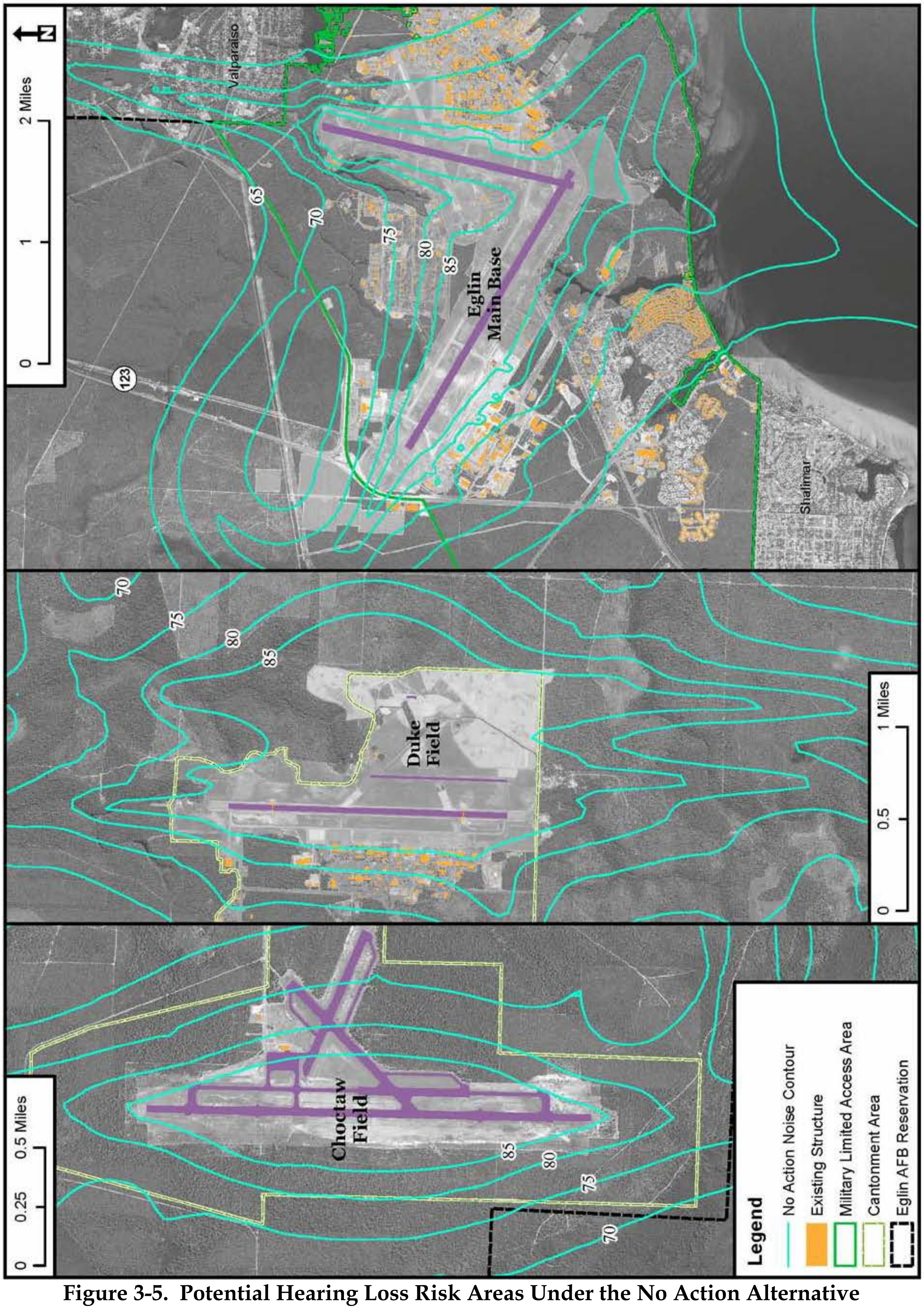


Figure 3-5. Potential Hearing Loss Risk Areas Under the No Action Alternative

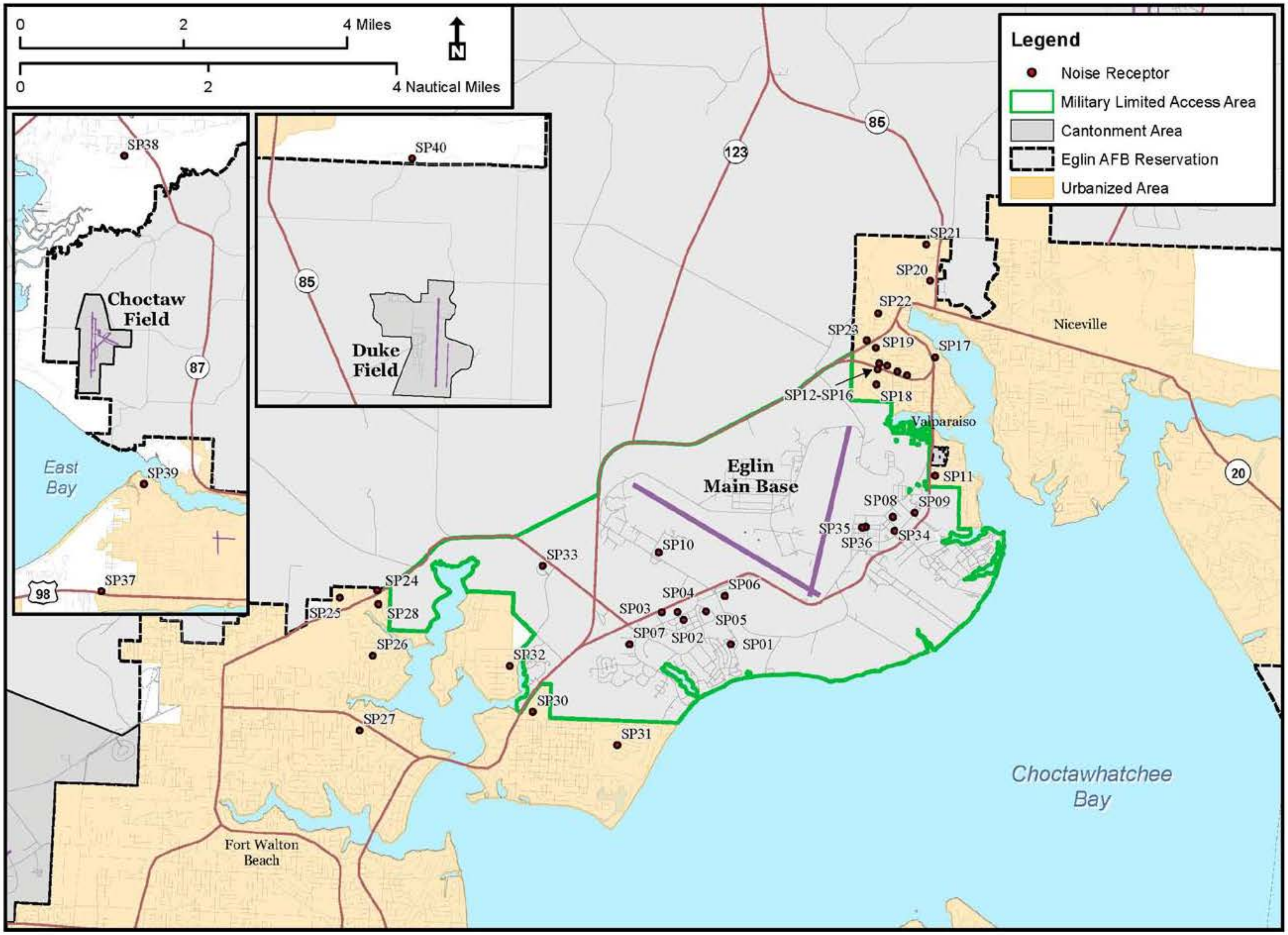


Figure 3-6. Location of Representative Noise-Sensitive Locations

Table 3-5. Representative Noise-Sensitive Receptors Under the No Action Alternative[1]

Loc. ID	General Description	No Action	
		DNL (dB)	Top 20 SELs (dB)[2]
SP01	Eglin Housing (Capehart)	70	92–108
SP02	Eglin Housing (Ben's Lake)	70	96–108
SP03	Chapel 2 - building 2574	70	94–111
SP04	Cherokee Elementary School	70	96–110
SP05	Child Development Center	72	97–112
SP06	Oakhill School (closed in 2009)	77	102–117
SP07	Eglin Hospital	64	89–107
SP08	Eglin VAQ and Dorms	69	91–106
SP09	Eglin Chapel 1	66	87–102
SP10	Joint Strike Fighter Academic Training Facility	76	101–115
SP11	Lewis Middle School	62	84–99
SP12	Okaloosa STEMM Center (Valparaiso)[3]	65	83–111
SP13	First Assembly of God (Valparaiso)	68	85–115
SP14	New Hope Baptist (Valparaiso)	68	88–115
SP15	Sovereign Grace Church (Valparaiso)	63	81–107
SP16	First Baptist Church (Valparaiso)	62	79–105
SP17	Unitarian Church (Valparaiso)	58	79–100
SP18	#1 Housing (Valparaiso)	68	87–114
SP19	#2 Housing (Valparaiso)	71	89–119
SP20	Edge Elementary School	58	80–105
SP21	Twin Cities Medical Center	60	81–108
SP22	Niceville Community Church	74	85–123
SP23	Private School (Niceville)	78	87–126
SP24	Private School (Fort Walton)	55	74–99
SP25	Okaloosa Walton College	53	72–95
SP26	Kenwood Elementary	54	73–97
SP27	Pryor Middle School	53	75–95
SP28	Housing (Fort Walton Beach)	55	74–99
SP29	Residential property south of Hwy 90 in Crestview	49	72–92
SP30	Shalimar Elementary School	58	81–103
SP31	Shalimar Residential	60	82–103
SP32	Residential Poquito Bayou West Side	58	79–100
SP33	University of Florida's Research and Engineering Education Facility	63	84–110
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	70	91–107
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	74	96–112
SP36	Eglin Law Center (building 2)	75	97–113
SP37	Saint Sylvester Catholic Church, Gulf Breeze	<45	51–75
SP38	Residential, north of Choctaw	<45	54–77
SP39	Residential, south of Choctaw	48	62–84
SP40	Okaloosa County Prison	60	85–109

< = less than; dB = decibels; DNL = day-night average sound level; HQ = Headquarters; Hwy = Florida Highway; SEL = sound exposure level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools, hospitals, and churches presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.

2. Top 20 SEL refers to the range of SEL decibel noise levels generated by the 20 profiles that contribute most to overall DNL noise level at that location. Refer to Appendix E, *Noise*, for tables that describe the top 20 profiles.

3. Previously Valparaiso Elementary School.

Note: Calculated military noise below the DNL ambient sound level of 45 dB is listed as <45 dB.

Under No Action Alternative conditions, noise levels at and near the locations listed in Table 3-5 would be expected to result in annoyance. Furthermore, individual loud overflight events could interfere with activities such as conversing, watching television, or sleeping.

Equivalent Sound Level (L_{eq}) at Representative Local Schools

Good acoustical qualities are essential in classrooms in which speech communication is an important part of the learning process. Excessive background noise interferes with speech communication and thus presents an acoustical barrier to learning. The American National Standards Institute's (ANSI) Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools provides "acoustical performance criteria, design requirements, and design guidelines for new school classrooms and other learning spaces" (ANSI, 2009). While this standard is not a requirement to be followed by school systems, it is applicable as a design guideline to new construction, as well as renovations of existing facilities, and is recommended to achieve a high degree of speech intelligibility in learning spaces. Because this ANSI standard was not finalized until 2009, it should not be expected that all schools constructed or renovated before that date would necessarily meet the recommended criteria.

The ANSI standard identifies an appropriate set of criteria for maximizing speech intelligibility in schools as an indoor L_{eq} of 40 dBA (for intermittent noise from transportation sources such as aircraft operations). To compare the outdoor noise levels to indoor recommended values, outdoor noise levels are adjusted to account for the noise level reduction (NLR) provided by the structure. Typical NLR values are 15 dB with windows open and 25 dB with windows closed, but vary by structure, climate, and noise sources. It is assumed that each of the schools within the ROI maintains a "windows closed" condition and provides approximately 25 dB NLR.

Table 3-6 lists the minimum and maximum estimated indoor hourly L_{eq} values under the No Action Alternative during a typical school day (7:00 AM – 4:00 PM, Monday–Friday) at several schools located near Eglin Main Base. The minimum and maximum hourly L_{eq} values provide the expected range of noise levels to which the schools could be exposed on a typical day. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI standard for at least a portion of one hour during a typical school day. Appendix E lists hourly L_{eq} for each hour of the school day giving some indication as to which hours of the day might be more disruptive of learning.

The locations of the assessed schools are shown in Figure 3-6. Under the No Action Alternative, two active schools, an educational center, and a daycare would be expected to exceed the recommended noise guidelines. Oakhill School closed in 2009 due to factors not related to noise.

Table 3-6. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Base Under the No Action Alternative[1]

Location ID	General Description	Indoor Minimum Hourly L_{eq}[2]	Indoor Maximum Hourly L_{eq}[2]
SP04	Cherokee Elementary School	<=40	49
SP05	Child Development Center	42	51
SP06	Oakhill School (closed in 2009)	47	55
SP11	Lewis Middle School	<=40	<=40
SP12	Okaloosa STEMM Center (Valparaiso)[3]	<=40	44
SP20	Edge Elementary School	<=40	<=40
SP23	Private School (Niceville)	47	56
SP24	Private School (Fort Walton Beach)	<=40	<=40
SP26	Kenwood Elementary School	<=40	<=40
SP27	Pryor Middle School	<=40	<=40
SP30	Shalimar Elementary School	<=40	<=40

< = less than; ANSI = American National Standards Institute; dB = decibels; L_{eq} = equivalent sound level; NLR = noise level reduction; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools presented in this table are provided to help the public better understand the noise environment. As such, this table may not include all schools that are affected by aircraft noise exposure.
2. Indoor L_{eq} is assumed to be 25 dB less than outdoor L_{eq} due to the NLR provided by the structure with windows closed. Actual outdoor-to-indoor NLR varies from school to school and between locations within individual schools.
3. Previously Valparaiso Elementary School.

Note: Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <=40 dB.

Airspace Noise (using the L_{dnmr} and CDNL metrics)

The ROI for noise in the airspace includes the areas beneath training airspace units proposed for use. Ambient noise levels beneath the airspace units proposed for JSF training have not been measured. However, areas under the military training airspace units are generally rural with scattered population centers, and ambient noise levels are assumed to be similar to ambient noise levels in other similar locations. The USEPA has stated 44 dB and 51 dB as typical DNL noise levels at a farm area and a low-density residential area, respectively (USEPA, 1974). Based on these data, ambient noise levels beneath the MTRs are assumed to be approximately 45 dB DNL.

Onset-rate adjusted monthly day-night average sound level (L_{dnmr}) (i.e., subsonic aircraft noise) and CDNL noise levels (sonic booms, etc.) were calculated based on representative estimates of military aircraft types, configuration, and frequency of operations under the No Action Alternative (Table 3-7). Airspace proposed for use is currently used by a wide variety of military aircraft. While civilian aircraft do transit the MTRs, their passage is not recorded by the DoD and the noise generated is generally low in comparison to the noise generated by military aircraft. On MTRs aircraft are modeled as being more likely to fly near the route centerline, with the likelihood of overflight tapering off towards the edges of the route. To estimate noise impacts conservatively, the route centerline noise level is reported. Noise levels beneath the routes would also vary as a result of differences in established minimum flight altitudes on different segments of the route. The noise levels reported in Table 3-7 are the highest noise levels beneath the route. In instances where aircraft noise is less than the ambient noise level, ambient noise would be dominant and the ambient level is listed in the table instead of the military aircraft noise level. It should be recognized that, even when the average military aircraft noise level is below ambient, aircraft noise may still be audible and some percentage of people may become highly annoyed.

Table 3-7. Subsonic (L_{dnmr}) and Supersonic (CDNL) Noise Levels and Percent Population Highly Annoyed Beneath Training Airspace Under the No Action Alternative

Special Use Airspace	Segment	No Action Alternative (subsonic)		No Action Alternative (supersonic)	
		Noise Level (dB L_{dnmr})	% Population Highly Annoyed[1]	Noise Level (dB CDNL)	% Population Highly Annoyed[1]
R-2914A	n/a	60	6	n/a	n/a
R-2914B	n/a	<45	<1	n/a	n/a
R-2915A	n/a	61	7	n/a	n/a
R-2915B	n/a	66	14	n/a	n/a
R-2915C	n/a	<45	<1	n/a	n/a
R-2919A	n/a	56	4	n/a	n/a
R-2919B	n/a	<45	<1	n/a	n/a
Eglin MOA A East	n/a	62	8	n/a	n/a
Eglin MOA A West	n/a	62	8	n/a	n/a
Eglin MOA B	n/a	<45	<1	n/a	n/a
Eglin MOA C	n/a	63	10	n/a	n/a
Rose Hill MOA	n/a	49	1	n/a	n/a
Tyndall MOA C	n/a	59	6	n/a	n/a
Tyndall MOA D	n/a	62	8	n/a	n/a
Tyndall MOA E	n/a	54	3	n/a	n/a
Tyndall MOA F	n/a	59	6	n/a	n/a
Camden Ridge	n/a	57	4	n/a	n/a
Pine Hill E	n/a	<45	<1	n/a	n/a
Pine Hill W	n/a	<45	<1	n/a	n/a
Moody 3	n/a	<45	<1	n/a	n/a
De Soto 1 MOA	n/a	51	2	n/a	n/a
De Soto 2 MOA	n/a	53	3	n/a	n/a
R-4401A	n/a	53	3	n/a	n/a
R-4401B	n/a	<45	<1	n/a	n/a
W-151A	n/a	48	1	49	2
W-151B	n/a	46	1	48	2
W-151C	n/a	47	1	47	2
W-151D	n/a	<45	<1	47	2
W-151E	n/a	<45	<1	<45	<1
W-151F	n/a	<45	<1	<45	<1
W-155A	n/a	<45	<1	<45	<1
W-155B	n/a	<45	<1	<45	<1
W-470A	n/a	<45	<1	47	2
W-470B	n/a	<45	<1	47	2
W-470C	n/a	<45	<1	45	1
IR-017	A-B	52	2	n/a	n/a
IR-017	B-C	52	2	n/a	n/a
IR-017	C-D	52	2	n/a	n/a
IR-017	D-E	52	2	n/a	n/a
IR-017	E-F	53	3	n/a	n/a
IR-017	F-G	53	3	n/a	n/a

Table 3-7. Subsonic (L_{dnmr}) and Supersonic (CDNL) Noise Levels and Percent Population Highly Annoyed Beneath Training Airspace Under the No Action Alternative, Cont'd

Special Use Airspace	Segment	No Action Alternative (subsonic)		No Action Alternative (supersonic)	
		Noise Level (dB L_{dnmr})	% Population Highly Annoyed[1]	Noise Level (dB CDNL)	% Population Highly Annoyed[1]
IR-017	G-H	52	2	n/a	n/a
IR-017	D1-AA	45	1	n/a	n/a
IR-017	AA-AB	45	1	n/a	n/a
IR-031	A-A1	<45	<1	n/a	n/a
IR-031	A1-A2	<45	<1	n/a	n/a
IR-031	A2-B	52	2	n/a	n/a
IR-031	B-C	53	3	n/a	n/a
IR-031	C-D	52	2	n/a	n/a
IR-031	D-E	52	2	n/a	n/a
IR-031	E-F	52	2	n/a	n/a
IR-031	F-G	52	2	n/a	n/a
IR-031	G-H	52	2	n/a	n/a
IR-031	H-I	52	2	n/a	n/a
IR-031	I-J	52	2	n/a	n/a
IR-031	J-K	52	2	n/a	n/a
IR-031	K-L	52	2	n/a	n/a
IR-031	L-M	52	2	n/a	n/a
IR-031	M-N	52	2	n/a	n/a
IR-031	N-O	52	2	n/a	n/a
IR-031	O-P	52	2	n/a	n/a
VR-1082	A-B	62	8	n/a	n/a
VR-1082	B-C	63	10	n/a	n/a
VR-1082	C-D	63	10	n/a	n/a
VR-1082	D-E	62	8	n/a	n/a
VR-1082	E-F	55	3	n/a	n/a
VR-1082	F-G	55	3	n/a	n/a
VR-1082	G-H	55	3	n/a	n/a
VR-1082	DA-E	55	3	n/a	n/a
VR-1085	A-B	62	8	n/a	n/a
VR-1085	B-C	61	7	n/a	n/a
VR-1085	C-D	61	7	n/a	n/a
VR-1085	D-E	61	7	n/a	n/a
VR-1085	E-F	61	7	n/a	n/a
VR-1085	F-F1	55	3	n/a	n/a
VR-1085	F1-F2	63	10	n/a	n/a
VR-1085	E-F	61	7	n/a	n/a
VR-1085	F-G	53	3	n/a	n/a
VR-1085	G-H	53	3	n/a	n/a
VR-1085	H-I	53	3	n/a	n/a

< = less than; CDNL = C-weighted day-night average sound level; IR = instrument route; L_{dnmr} = onset-rate adjusted monthly day-night average sound level; MOA = military operating area; n/a = not applicable; R- = Restricted Area; VR = visual route; W = Warning Area

1. Percentage of population highly annoyed was calculated using standard Air Force methodology, as described in Finegold et al., 1994.

Average subsonic noise levels beneath R-2915B would exceed 65 dB L_{dnmr} under the No Action Alternative by 1 dB, while noise levels beneath all other airspace units would remain below 65 dB L_{dnmr} (Table 3-7). The Air Force considers all land uses to be compatible at noise levels below 65 dB DNL, and considers noise-sensitive land uses such as residences to be conditionally compatible at 65 to 70 dB DNL if the structure provides above-average noise attenuation.

As shown in Table 3-7, sonic boom noise levels would remain well below 55 dB CDNL. Supersonic training is only permitted in airspace units located entirely over water. Although sonic booms may travel outwards from these training areas and be heard on land, this event is relatively infrequent.

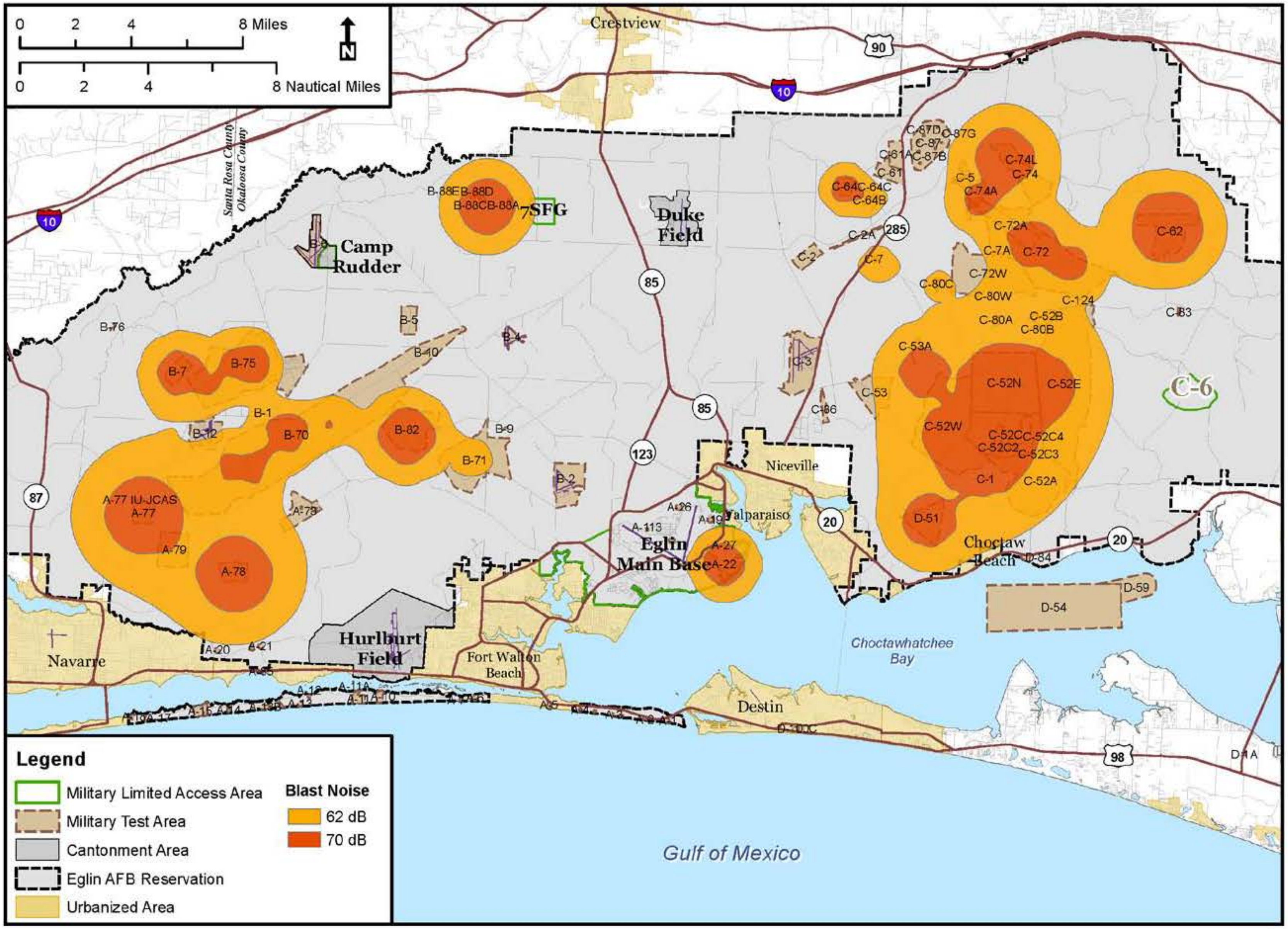
The percentage of persons affected by subsonic and supersonic noise levels that would be expected to become highly annoyed was estimated using the standard Air Force methodology, as described in Finegold et al. (1994) and CHABA (1981), respectively. Noise impacts would be expected to be limited to annoyance and speech/activity interference.

Munitions Noise

Detonation of high-explosive munitions is a major noise and vibration source on the Eglin Range and would continue to occur under the No Action Alternative. Time-averaged noise levels generated by munitions use under the No Action Alternative are shown in Figure 3-7. The contours shown in the figure reflect the total munitions noise environment at Eglin AFB, which includes existing munitions use as well as JSF munitions use under the No Action Alternative (Table 2-3). Under the No Action Alternative, 73.6, 68.6, and 21.2 acres of land located off-range in portions of Choctaw Beach, Valparaiso, and Navarre, respectively, would be impacted by noise levels greater than 62 dB CDNL as a result of all Eglin AFB munitions use. Please note that the acreage associated with the munitions noise contours in the vicinity of Valparaiso is not a result of any JSF munitions use.

Munitions used include several types of bombs, missiles, and explosives charges. Peak noise levels resulting from individual detonation events currently do not normally exceed 130 dB at off-range locations. As the munitions used by the JSF would not be new to Eglin Range and existing targets would continue to be used, peak noise levels would not increase from those experienced currently. The peak noise level of 130 dB is the threshold above which risk of complaints is considered “high” (U.S. Army Center for Health Promotion and Preventive Medicine [USACHPPM], 2005). However, peak noise levels between 115 dB and 130 dB, which are associated with low to moderate risk of complaints, may be regularly experienced off-range as a result of munitions training. Noise-induced structural vibrations and secondary vibrations (i.e., rattling of objects within the structure) may occur at noise levels exceeding 110 dB. However, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (CHABA, 1977).

Figure 3-7. High-Explosives Munitions Noise (CDNL) Under the No Action Alternative



Number of Noise Events Analysis

Table 3-8 provides a list of locations and the number of times during a day that one might experience disruption of communications or activities based on the possible number of noise events exceeding an L_{max} of 50 dB. The number of events represents the conditions under the No Action Alternative, including operations for both the F-35 with flight restrictions imposed on RW 01/19 and all other aircraft operating at Eglin AFB. For example, under the No Action Alternative at Eglin's Capehart housing, a resident could experience as many as 159 disruptive events each day.

Table 3-8. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under the No Action Alternative

Location ID	Location of Interest	No Action Alternative
SP01	Eglin Housing (Capehart)	159
SP02	Eglin Housing (Ben's Lake)	157
SP03	Chapel 2 - building 2574	151
SP04	Cherokee Elementary School	156
SP05	Child Development Center	155
SP06	Oakhill School (closed in 2009)	162
SP07	Eglin Hospital	119
SP08	Eglin VAQ and Dorms	135
SP09	Eglin Chapel 1	127
SP10	Joint Strike Fighter Academic Training Facility	168
SP11	Lewis Middle School	109
SP12	Okaloosa STEMM Center (Valparaiso)	121
SP13	First Assembly of God (Valparaiso)	133
SP14	New Hope Baptist (Valparaiso)	124
SP15	Sovereign Grace Church (Valparaiso)	114
SP16	First Baptist Church (Valparaiso)	109
SP17	Unitarian Church (Valparaiso)	36
SP18	#1 Housing (Valparaiso)	134
SP19	#2 Housing (Valparaiso)	90
SP20	Edge Elementary School	18
SP21	Twin Cities Medical Center	22
SP22	Niceville Community Church	113
SP23	Private School (Niceville)	121
SP24	Private School (Fort Walton)	20
SP25	Okaloosa Walton College	10
SP26	Kenwood Elementary	16
SP27	Pryor Middle School	12
SP28	Housing (Fort Walton Beach)	19
SP29	Residential property south of Hwy 90 in Crestview	7
SP30	Shalimar Elementary School	23
SP31	Shalimar Residential	40
SP32	Residential Poquito Bayou West Side	26
SP33	University of Florida Research and Engineering Education Facility	73
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	137

Table 3-8. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under the No Action Alternative, Cont'd

Location ID	Location of Interest	No Action Alternative
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	163
SP36	Eglin Law Center (building 2)	168
SP37	Saint Sylvester Catholic Church, Gulf Breeze	0
SP38	Residential, north of Choctaw	0
SP39	Residential, south of Choctaw	1
SP40	Okaloosa County Prison	41

< = less than; dB = decibels; DNL = day-night average sound level; HQ = Headquarters; Hwy = Florida Highway; L_{max} = maximum sound level; ID = identification code; STEMM = Science, Technology, Engineering, Mathematics, and Medical

Construction Noise

Construction noise under the No Action Alternative would be as described in the FEIS. Noise generated by construction vehicles could potentially annoy people in the immediate vicinity of construction sites. However, construction noise would be temporary, lasting only the duration of the construction project, and would be expected to be limited to normal working hours (7:00 AM to 5:00 PM). Construction and demolition (C&D) projects could generate minor vibration in nearby structures while impact tools such as jackhammers are in use. Noise impacts associated with construction noise and vibration would be limited to annoyance while projects are under way.

3.4 LAND USE

3.4.1 Definition

Land use generally refers to the management and use of land by people. The attributes of land use include general land use patterns, land ownership, land management plans, and special use areas. General land use patterns characterize the types of uses within a particular area. Specific uses of land typically include residential, commercial, industrial, agricultural, military, public/institutional, and recreational. Land use also includes areas set aside for preservation or protection of natural resources, wildlife habitat, vegetation, or unique features. Management plans, policies, ordinances, and regulations determine the types of uses that are allowable, or the types of uses that protect specially designated or environmentally sensitive uses.

3.4.2 Region of Influence

The ROI for land use includes airfield and adjacent communities and land areas proposed for beddown and training operations of F-35 aircraft as described in Chapter 2 (Section 2.3.4 and Section 2.3.5). This includes the majority of Eglin AFB (Eglin Main Base, Duke Field, Choctaw Field, and the Eglin Range) and off-base areas in Okaloosa and Santa Rosa Counties, along with land area beneath special use airspace where flight activities will occur (see Table 3-1).

Appendix J, *Land Use*, of the FEIS provides a description of the on-base land use categories potentially impacted by the components of the FEIS's proposed action. Appendix J also identifies off-base land use categories and possible noise exposure and accident potential combinations for Eglin AFB aircraft operations.

The existing land use classes in the JSF Initial Joint Training Site (IJTS) area associated with the 33rd Fighter Wing (33 FW) include airfield (primary surface/clear zones [CZs]); airfield (runway/ taxiway/apron); aircraft operations and maintenance (O&M); industrial; and open space. Adjacent land uses include administrative (University of Florida's Research and Engineering Education Facility); community (Service) (including the Air Force Armament Museum, Okaloosa Regional Airport, and Eglin Elementary School, youth center, child care center, playground, etc., immediately south of Eglin Boulevard); medical (Eglin Hospital and Veterans Affairs Clinic); and accompanied housing (Eglin Housing Area). Located further west are the range areas of the Eglin Reservation. Additional administrative, community (Service), community (commercial), housing (accompanied), housing (unaccompanied), and medical land uses are associated with the 96 TW area on the east side of Eglin Main Base.

Activities associated with Eglin Main Base primarily affect nonmilitary land to the northeast of the airfield, including the cities of Valparaiso and Niceville, and unincorporated areas of Okaloosa County. Valparaiso comprises a diverse mix of moderate density land uses. Single family residential uses exist throughout Valparaiso and in the northwest corner of Niceville. Strip commercial uses are prevalent along John Sims Parkway (Florida Highway [Hwy] 20 and Hwy 327), Valparaiso Parkway (Hwy 190), and Government Avenue (Hwy 85). Mixed uses consisting of medium- and high-density residential, public/quasi-public, and commercial uses occur along both sides of South John Sims Parkway and along Hwy 85 between north of West John Sims Parkway and West College Boulevard. Land uses in the triangle formed by Government Avenue, Valparaiso Parkway, and North John Sims Parkway are also mixed, with large areas of public/quasi public uses including schools and churches (U.S. Air Force, 2006b).

Duke Field encompasses approximately 2,700 acres in the north central portion of Eglin AFB and is home to the 919th Special Operations Wing (919 SOW) (an Air Force Reserve Unit). Duke Field requires land uses similar to those at Eglin Main. For instance, Duke Field contains extensive airfield land use, which includes an 8,000-foot runway and the associated taxiways, aprons, and aircraft O&M facilities. Other facilities include range laser amenities, base operations and supply, airmen housing, an all-ranks club, fire department, and outdoor recreation facilities. The land area for each use is considerably less than that of Eglin Main Base. Duke Field is surrounded for several miles by federal land and the closest populated area is located 3.5 miles northwest of Duke Field in the city of Crestview.

Choctaw Field is located in the western portion of Eglin AFB in Santa Rosa County and, like Duke Field, is surrounded by federal land. The closest populated area is the town of Holley, which is located approximately 4 miles southeast of Choctaw Field. The existing land use categories at Choctaw Field include airfield (runway, taxiway, apron); airfield (primary surface/CZs); and aircraft O&M, which includes a control tower, support buildings, and facilities for fire and rescue ground crews. Currently, the field is surrounded by wooded timberland, open fields, and state-owned conservation land; no developed areas are in the vicinity. Property surrounding Choctaw Field, managed by Eglin AFB, is designated as open space. Uses include military training activities and recreation.

In addition, airspaces and MTRs in Alabama, Florida, Georgia, and Mississippi will be utilized for flight training activities. The overland airspaces cover approximately 15,350 square miles. The MTRs cover approximately 4,600 square miles. The majority of land uses associated with these airspaces are undeveloped forest and agricultural use. While several small cities and towns exist in these areas, residential and urban land use is infrequent. Table 3-9 lists airspace units and percentage of residential/urban areas underlying each.

Table 3-9. Residential/Urban Area Associated with Training Airspace Units

Airspace/MTRs	% of Residential/Urban Land
Carabelle East/West ATCAA	0.72
Compass Lake ATCAA	0.56
Desoto MOAs	0.18
Moody 1 and 2 MOAs	0.84
Moody 3 MOA	0.47
Pine Hill MOA	0.41
Rose Hill MOA	0.78
Camp Shelby/R4401	0.03
IR-31	0.21
IR-17	0.68

Source: U.S. Geological Survey, 2010

ATCAA = Air Traffic Control assigned airspace; IR = instrument route; MOA = military operating area; MTR = military training route

3.4.3 Analysis Methodology

A *qualitative* method was used to assess potential land use impacts. On-base impacts are based on if the Proposed Action would result in a change to the existing land use, the degree to which the existing land use would be affected by the change, and if the change would be compatible with adjacent land uses and development. Off-base land use impacts are based primarily on the analysis of the effects of JSF flight operations and if the change in noise exposure would have an adverse impact on land use compatibility. Incompatible land use impacts that would result from noise generated from JSF IJTS operations were evaluated using the AICUZ guidelines presented in the 2006 AICUZ study for Eglin AFB (U.S. Air Force, 2006b) and accident potential zone (APZ) guidelines.

The AICUZ Program is used to promote compatible land development in areas subject to aircraft noise and accident potential. The AICUZ compatible use zones include the CZ, APZ I, APZ II, and four noise zones. The CZ, APZ I, and APZ II are the zones classified by the military that are located immediately off the end of the runways. These zones delineate the areas with the highest accident potential based on historical accident data. The CZs and APZs currently at Eglin Main Base were originally established in 1976 and would not change as a result of the beddown of the F-35. For homes and structures currently in these areas, the Air Force AICUZ program already applies. The AICUZ noise zones are defined as 65–69 dB DNL, 70–74 dB DNL, 75–79 dB DNL, and greater than 80 dB DNL. However, since land use compatibility impacts primarily occur with noise levels greater than 75 dB DNL, potential impacts are evaluated and shown in two primary noise levels, 65–74 dB DNL and 75+ dB DNL.

Additional information and detail on the methodology for analyzing potential impacts is available in Chapter 3 of the FEIS.

3.4.4 Laws and Regulations

No specific laws or regulations govern land use issues; however, DoD Instruction 4165.57, Air Force Handbook 32-7084, and Unified Facilities Criteria 3-260-01: Appendix B, Section 3, provides DoD policy on achieving compatible use of public and private lands in the vicinity of military airfields. The U.S. Department of Transportation publication, *Standard Land Use Coding Manual*, provides a uniform coding system for classifying land use. FICUN's *Guideline for Considering Noise in Land-Use Planning and Control* helps to integrate the consideration of noise into the overall comprehensive planning and interagency/intergovernmental coordination process.

3.4.5 No Action Alternative Consequences

Military Land Use

Construction-related impacts to land use associated with the No Action Alternative were previously analyzed in the FEIS, and all construction was authorized by the February 2009 Record of Decision (ROD).

Figure 3-8 shows the existing land use for Eglin Main Base and the JSF noise contours for the No Action Alternative. Approximately 8,183 acres of Eglin Main Base property could be exposed to noise levels greater than 65 dB DNL.

Sensitive noise receptors at Eglin Main Base that would be impacted from noise exposures greater than 75 dB DNL include the Oakhill School, horse stables, and portions of the Eglin Downtown Area on the east side of the airfield, including part of the Georgia Avenue housing area.

Approximately all 1,284 acres of Duke Field property could be exposed to noise levels greater than 65 dB DNL. The entire developed area of Duke Field would experience increased noise exposure of greater than 75 dB DNL, including the unaccompanied housing area (Figure 3-9).

Approximately 1,616 acres of Eglin AFB property in the vicinity of Choctaw Field could be exposed to noise levels greater than 65 dB DNL (Figure 3-10). However, the increase in noise exposure would not have any adverse impacts on the existing land use compatibility at Choctaw Field.

The impacted on-base area surrounding Eglin Main Base, Duke Field, and Choctaw Field is part of the interstitial area of the Eglin Range that is used for military training activities and is open to public access for recreational activities. The increase in noise exposure above 65 dB DNL would not result in adverse land use impacts or compatibility issues.

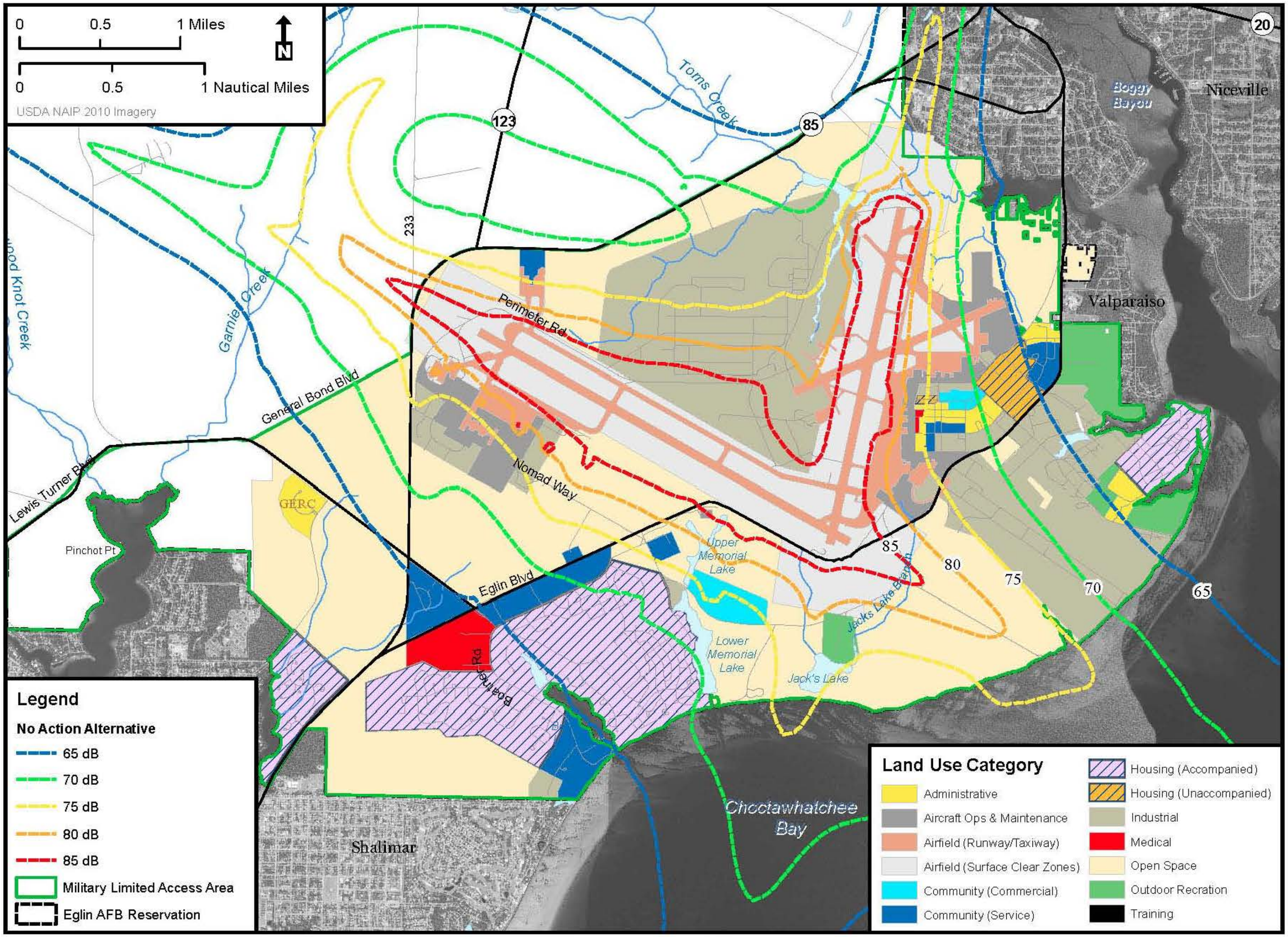


Figure 3-8. On-base Land Use at Eglin AFB – No Action Alternative

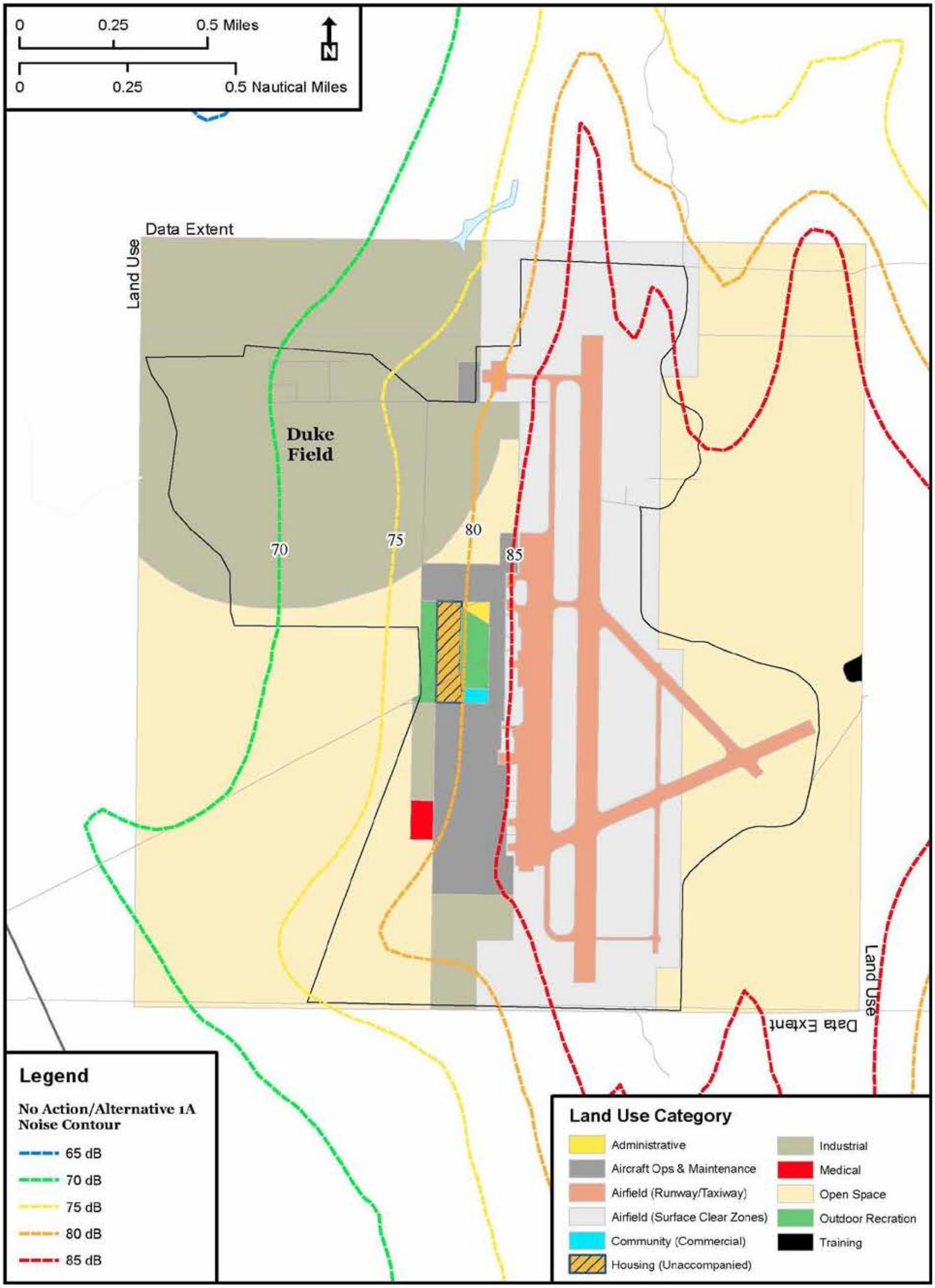


Figure 3-9. On-base Land Use at Duke Field – No Action Alternative

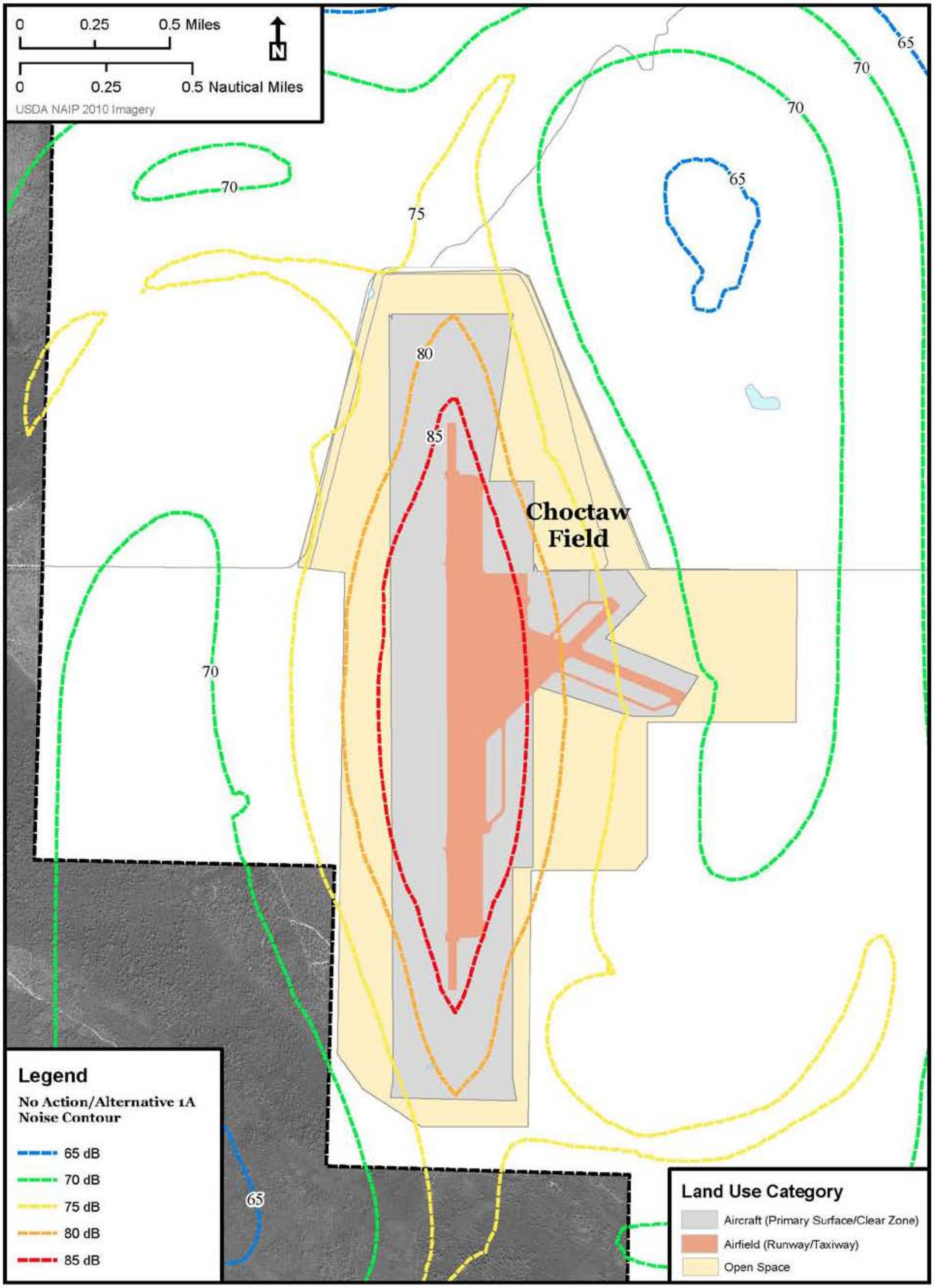


Figure 3-10. On-base Land Use at Choctaw Field – No Action Alternative

Community Land Use

Adverse land use compatibility impacts would be greatest within residential areas exposed to noise levels above 75 dB DNL. Noise exposure above 75 dB DNL would impact most uses in the Public/Quasi-Public category and some uses within the Commercial category unless measures for NLR were included in the design and construction of the buildings. Existing buildings without NLR measures could be retrofitted to minimize the impact. Land use compatibility in the Recreational category could be adversely impacted depending on the specific use. Most uses in the industrial and open/agricultural/low-density categories are compatible without restrictions.

Table 3-10 shows the off-base land use categories and the total number of acres exposed to noise levels greater than 65 dB DNL and greater than 75 dB DNL for areas off Eglin Main Base, Duke Field, and Choctaw Field under the No Action Alternative.

The total off-base area in the vicinity of Eglin Main Base (Figure 3-11) and north of Duke Field (Figure 3-12) that would be exposed to aircraft noise greater than 65 dB DNL is 685 and 0.08 acres, respectively. Using Choctaw Field as an auxiliary field would expose 2,134 acres to aircraft noise greater than 65 dB DNL, which includes undeveloped land to the south of Choctaw Field in Santa Rosa County (Figure 3-13).

Table 3-10. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – No Action Alternative

Land Use Category	Number of Acres Impacted					
	Eglin Main		Duke Field		Choctaw Field	
	65–74 dBA	75+ dBA	65–74 dBA	75+ dBA	65–74 dBA	75+ dBA
Residential	235.5	12.9	0.01	0	0	0
Commercial	58.2	26.3	0	0	0	0
Industrial	10	1.8	0	0	0	0
Open/Agricultural/Low-Density	290.6	32.7	0	0	2,076.6	57.4
Public/Quasi-Public	15.7	0	0.07	0	0	0
Recreational	1.3	0	0	0	0	0
Total Land Area	**611.3**	**73.7**	**0.08**	**0**	**2,076.6**	**57.4**

> = greater than; dBA = A-weighted decibels
Note: Land use estimates were made based on 2010 Northwest Florida Water Management District land use data (Florida Department of Environmental Protection [FDEP], 2010) and do not include water areas.

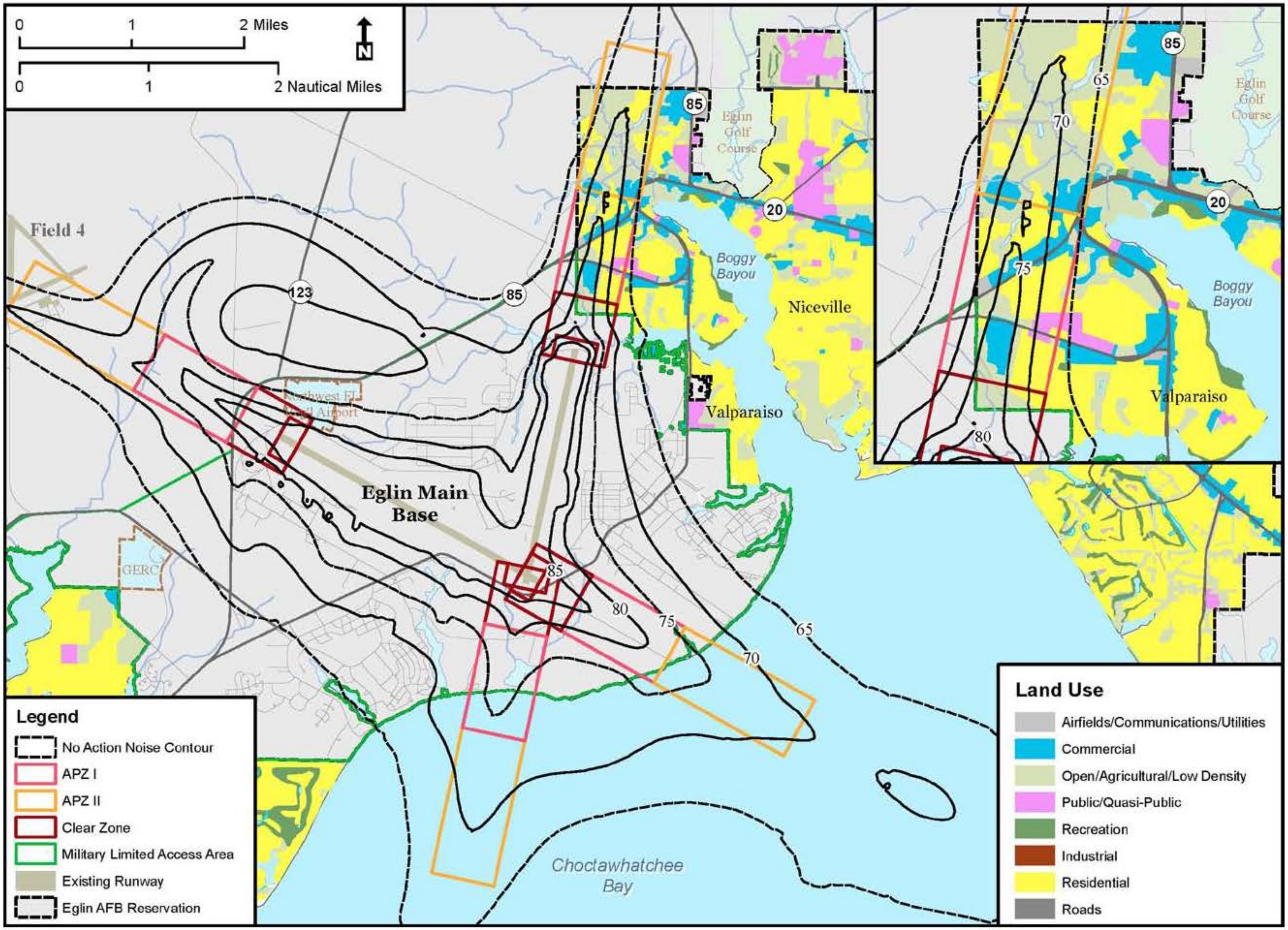


Figure 3-11. Off-base Land Use near Eglin Main – No Action Alternative

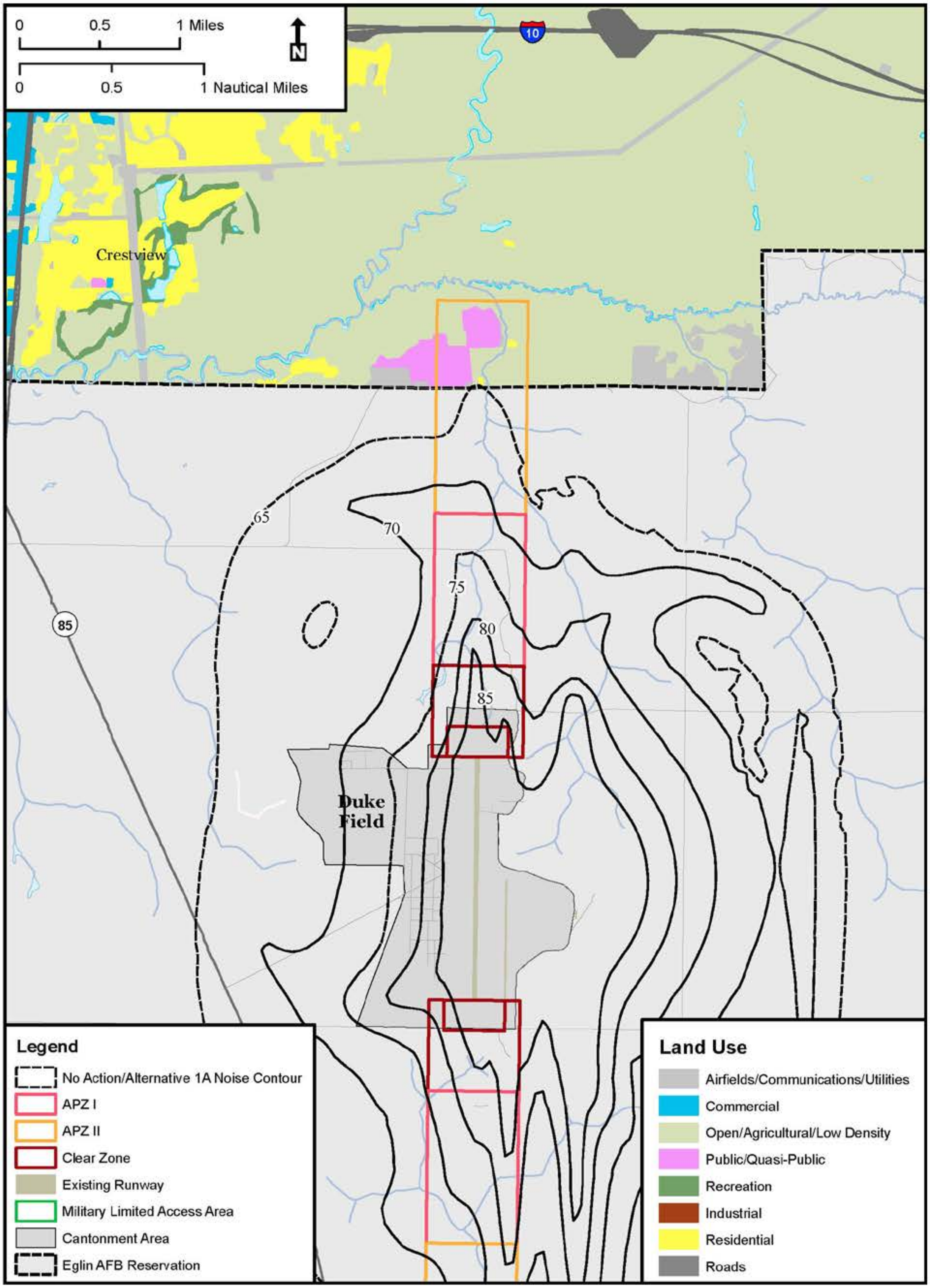


Figure 3-12. Off-base Land Use near Duke Field – No Action Alternative

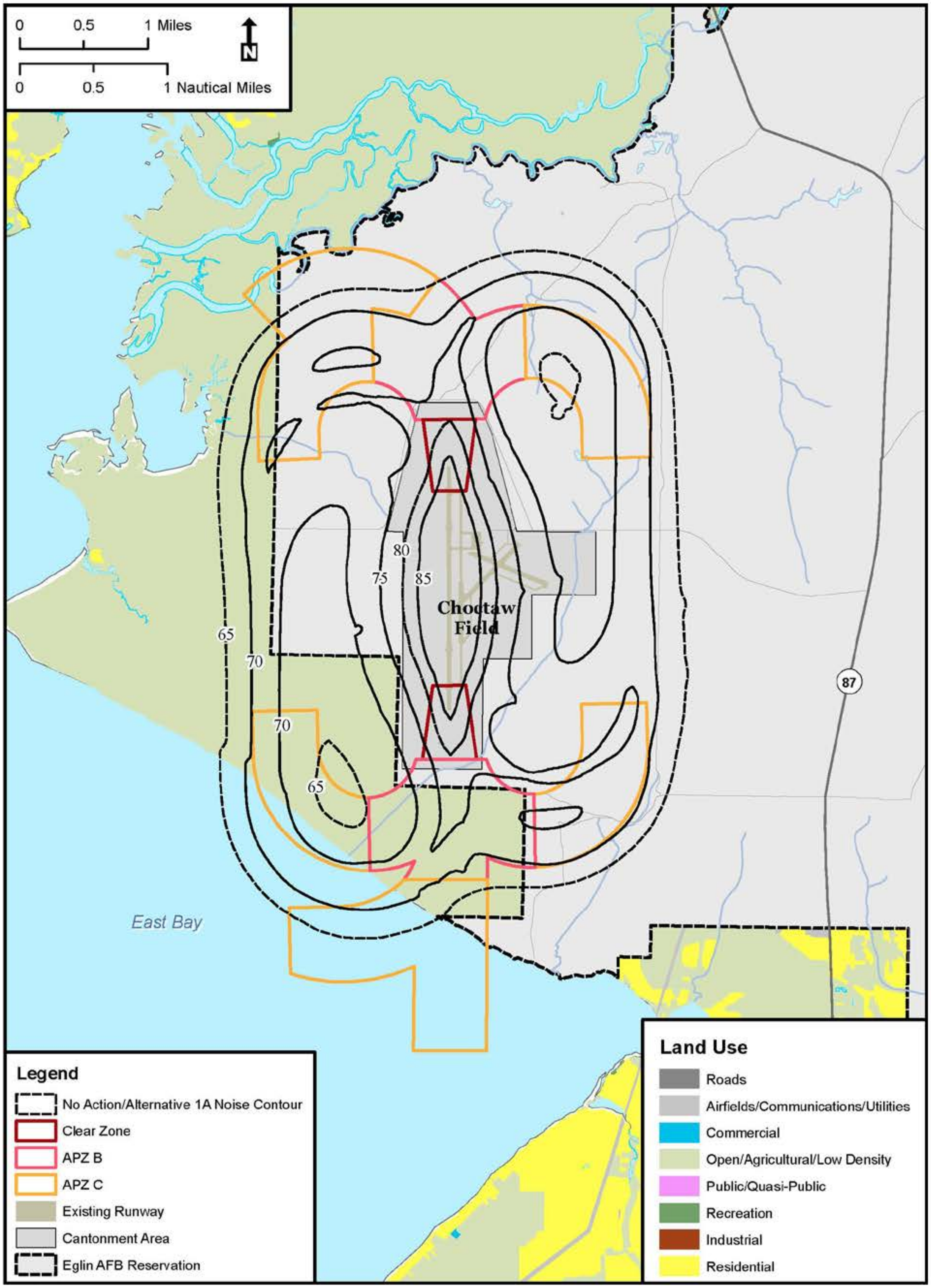


Figure 3-13. Off-base Land Use near Choctaw Field – No Action Alternative

Using Choctaw Field as an outlying field for JSF air operations would expose a total of approximately 2,805 acres of off-base property to noise levels greater than 65 dB DNL (Table 3-10). This includes the total off-base area on land and over water. Approximately 57 acres of off-base property could be exposed to noise levels greater than 75 dB DNL (Table 3-10). The affected area includes undeveloped land to the south of Choctaw Field in Santa Rosa County. The affected property is currently categorized as open/agricultural/low-density land, and no adverse impacts on the existing land use compatibility would occur. However, it is likely that in the future more of this area will be developed for low-density residential.

Aircraft training activities that do not utilize runways will occur at high altitudes inside the airspace units and MTRs. Land beneath these airspaces would not be exposed to aircraft noise greater than 65 dB DNL, resulting in no adverse land use impacts or compatibility issues.

3.5 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.5.1 Definition

Socioeconomic resources are defined as the basic attributes associated with human activities such as population characteristics, economic activity (including employment and income), and public services (schools, law enforcement, and emergency services). Actions that impact these socioeconomic indicators may have effects on other socioeconomic indicators such as housing availability.

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. In addition to environmental justice issues are concerns pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which directs federal agencies to the extent permitted by law and appropriate and consistent with the agency's mission to (a) make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

The analytical methods applied to environmental justice are in accordance with the *Interim Guide for Environmental Justice with the Environmental Impact Analysis Process* (U.S. Air Force, 1997). Estimates of these three population categories were developed based on data from the U.S. Census Bureau. Total and minority population figures are based on recent demographic data released from the 2010 Census (U.S. Census Bureau, 2010). The census does not report minority population, per se, but reports population by race and by ethnic origin. The 2010 Census did not collect information on income or poverty levels. The U.S. Census Bureau now collects and releases data on poverty through the American Community Survey. This survey provides five-year estimates down to the census tract level. The latest American Community Survey was released in 2010, providing estimates based on 2006–2010 data. Low-income populations include persons living below the poverty level ($21,954 for a family of four in 2009, adjusted based on household size) as reported in the 2006–2010 survey. The percentage of low-income persons is calculated as a percentage of all persons for whom the Census Bureau determines poverty status, which is generally a slightly lower number than the total population, as it excludes institutionalized persons, persons in military group quarters and in college dormitories, and unrelated individuals under 15 years old. For the purposes of this analysis, the low-income populations delineated in the 2006–2010 American Community Survey estimates were evaluated to the census tract level for the percentage of low-income persons in the affected 2006–2010 estimated population.

3.5.2 Region of Influence

The ROI for the socioeconomic and environmental justice resources for the Proposed Action is defined as Okaloosa, Santa Rosa, and Walton Counties. Potential impacts would be concentrated within these three counties.

3.5.3 Analysis Methodology

The context and intensity for the implementation of the F-35 beddown and training operations are used to quantify potential socioeconomic consequences in this SEIS. Socioeconomic impacts would be considered potentially significant if changes associated with the alternatives substantially affected the demand for housing or community services or substantially affected economic stability in the region.

Environmental justice analysis applies to adverse environmental impacts. Potential disproportionate impacts to minority or low-income populations are assessed only when adverse environmental consequences to the human population are anticipated; otherwise no analysis is required. The same is true for analysis of special risks to children, which would be driven by adverse environmental impacts. If adverse impacts are not anticipated, no special risk to children analysis is required. Environmental factors assessed in relation to determination of environmental justice concerns often include air quality, safety, hazardous materials, and noise. In the event that adverse environmental impacts to the human population are anticipated, the effects would be identified and the impact footprint would be mapped for the specified ROI.

The FAA and DoD have identified residential use as incompatible with noise levels above 65 dB DNL, unless special measures are taken to reduce interior noise levels for affected residences. Residential use is identified as incompatible regardless of noise attenuation at noise levels greater than 75 dB DNL (see Appendix E, *Noise*). Therefore, the environmental justice analysis focuses on off-base residents potentially affected by noise levels greater than 65 dB DNL. For additional detail, the analysis considers the total number of off-base residents affected as well as the residents affected specifically by noise levels from Eglin Main Base, Duke Field, and Choctaw Field.

Additional information and detail on the methodology for analyzing potential impacts is available in the FEIS.

3.5.4 Laws and Regulations

There are no specific regulations that govern socioeconomic aspects, such as employment, population, or public services.

3.5.5 No Action Alternative Consequences

Under the No Action Alternative, the JSF IJTS will beddown 59 F-35 aircraft as described in the February 2009 ROD. As a result of the 59 F-35 aircraft beddown, a daily total of 2,481 personnel, including students, permanent personnel, and contractors, would be added to the Eglin AFB-related population.

The incoming personnel would also be accompanied by their dependents. Due to a lack of demographic data on the JSF IJTS, the Air Force has assumed that every personnel member would be accompanied by 2.2 dependents for a total of 5,458 dependents (see Section 2.1.1 in Chapter 2). Therefore, the total incoming population directly related to the JSF IJTS would be 7,939 persons, an increase in the ROI's population of 2.05 percent.

Additional people are likely to migrate into the area in order to take advantage of the new job opportunities presented by the establishment of the JSF IJTS and the incoming personnel. Based on the number of jobs induced by the JSF IJTS, an estimated 1,039 persons have the potential to migrate to the area. The total potential increase in population would be 8,978 persons, an increase in the ROI's population of 2.32 percent.

The JSF IJTS would bring 2,481 new positions to Eglin AFB. These jobs would in turn induce job creation as the economy adjusts to support the change in population and additional incomes from the increase in employment. Using the IMPLAN economic impact model, which utilizes local economic multipliers, it is estimated that the new JSF IJTS would induce approximately 1,039 new jobs in the ROI. A number of these jobs would most likely be filled by unemployed or underemployed workers in the ROI or by the spouses of the incoming personnel. However, the total number of new jobs would be 3,520 and would increase employment in the ROI by 1.82 percent. The increase in Eglin AFB's population would also increase the total economic impact that Eglin AFB has on the ROI. The total economic impact of Eglin AFB would increase by over $161 million, bringing Eglin AFB's total economic impact on the ROI to nearly $1.9 billion.

A conservative estimate of the demand for housing assumes one job for one housing unit requirement and applies the assumption to the number of directly related jobs and the induced jobs created by the beddown of the JSF. Under this assumption, the demand for housing in the ROI would increase by a total of 3,520 housing units from a combination of the JSF IJTS personnel and induced population, representing approximately 1.74 percent of the total housing supply. Currently, the real estate market is soft, and there is an excess of housing units available for sale or rent. Okaloosa County alone has an estimated 22,000 vacant housing units. Many of these units may be vacation rentals; however, even if half of the housing units were vacation rentals, the housing market would have adequate capacity to accommodate the population change resulting from the beddown of 59 F-35 aircraft.

Table 3-11 presents information on the potential socioeconomic impacts resulting from the JSF IJTS personnel changes and changes in economic activity.

Spouses and children would accompany the incoming military and contractor personnel. A total of 1,802 children are estimated to accompany the incoming personnel. Using the national average of school-aged children, an estimated 1,294 children would be students, representing an increase of 2.03 percent in the ROI's student body. All of the school districts in the ROI have average class sizes below the maximum class sizes mandated by the state. Which schools would potentially be impacted would largely depend on the school attendance zone where the incoming personnel choose to locate. However, students are not necessarily confined to schools within their attendance zones. Okaloosa County School District operates a plan for Controlled School Choice Open Enrollment, which allows for students to attend schools outside of their attendance zone with a zoning waiver. This system allows parents and students a choice of schools within the district. Parents and students are required to complete a waiver application for the school of their choice. The schools evaluate the waiver applications and accept or deny the waiver based on capacity and space availability. There is a wide variability in the capacity of individual schools.

It is anticipated, therefore, that the school districts and existing schools in the ROI would have the capacity to accommodate the increase in student population while remaining in compliance with the maximum class size mandates. In addition, the increase in the population would also represent an increase in the tax base from which the school districts receive a large portion of revenue. With the increase in population, an estimated $13.08 million in additional revenues would be earned by the school districts, representing an increase of 2.31 percent.

Table 3-11. Potential Socioeconomic Impacts of the No Action Alternative in the Region of Influence

Category	No Action Alternative	
	Totals	Change
Population (persons)		
Existing Conditions	387,237	-
Direct	7,939	2.05%
Induced	1,039	0.27%
Total	396,215	2.32%
Employment (jobs)		
Existing Conditions	193,858	-
Direct	2,481	1.28%
Induced	1,039	0.54%
Total	197,378	1.82%
Housing (units)		
Existing Conditions	202,299	-
Direct	2,481	1.23%
Induced	1,039	0.51%
Total	205,819	1.74%
Students (persons)		
Existing Conditions	62,797	-
Direct	1,276	2.03%
Induced	n/a	n/a
Total	64,073	2.03%
School Revenue (in millions)		
Existing Conditions	$566.67	-
Direct	$11.57	2.04%
Induced	$1.51	0.27%
Total	$579.76	2.31%
Law Enforcement (persons)		
Existing Conditions	734	-
Direct	18	2.50%
Induced	2	0.33%
Total	**755**	**2.83%**

Table 3-11. Potential Socioeconomic Impacts of the No Action Alternative in the Region of Influence, Cont'd

Category	No Action Alternative	
	Totals	Change
Fire Protection (persons)		
Existing Conditions	922	-
Direct	23	2.50%
Induced	3	0.33%
Total	**948**	**2.83%**
Medical (persons)		
Existing Conditions	14,528	-
Direct	291	2.00%
Induced	38	0.26%
Total	**14,857**	**2.26%**

n/a = not applicable

The change in population is not expected to substantially change the demand for law enforcement, fire fighting services, or health care professionals. Based on the expected change in population from the addition of 59 F-35 aircraft, the number of law enforcement officers, firefighters, and health care professionals was estimated by applying the level of service (LOS) ratios to the new population in order to estimate the number of additional officers or professionals needed to maintain the same LOS. For law enforcement, 20 additional officers may be required to maintain a ratio of 2.3 officers per 1,000 persons. Twenty-six additional firefighters would be required to maintain a ratio of 2.9 firefighters per 1,000 persons. Furthermore, an additional 329 health care professionals may be required to maintain the current LOS.

Construction projects associated with the No Action Alternative would generate additional employment in the local region, particularly in the construction industry. It is possible that the magnitude of the construction activity would spur an increase in migration to the area as construction workers migrate to the area with construction opportunities. However, with the current capacity in the construction industry, it is expected that most of the new construction jobs would be filled by local workers that are currently unemployed or underemployed. Additionally, the construction activities would provide only temporary employment. Once the construction activities are complete, no additional construction employment would be required. Therefore, construction activities related to the No Action Alternative would be expected to generate temporary beneficial but not significant impacts to employment and economic activity in the ROI.

Under the No Action Alternative, flight operations of the F-35 aircraft are constrained so as to minimize noise impacts on residential areas. Table 3-12 summarizes the number of residents in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field potentially exposed to noise levels greater than 65 dB DNL. A total of approximately 1,800 residents, 1,797 of which live in the vicinity of Eglin Main Base, would be affected by average noise levels of 65 dB DNL and above. Approximately one affected resident would be in the vicinity of Duke Field, and approximately two affected residents would be in the vicinity of Choctaw Field. The highest average noise levels off-base would be 70 to 75 dB DNL, which would affect 174 residents in the vicinity of Eglin Main Base. No residents in the vicinity of Duke Field or Choctaw Field could be exposed to noise levels above 70 dB DNL under the No Action Alternative.

There are a number of factors that affect property values that make predicting impacts difficult. Factors directly related to the property, such as size, improvements, and the location of the property, as well as current conditions in the real estate market, interest rates, and housing sales in the area, are more likely to have a direct adverse impact on property values. Several studies have been conducted analyzing property values as they relate to military and civilian aircraft noise. One study conducted a regression analysis of property values as they relate to aircraft noise at two military installations (Fidell et al., 1996). This study found that while aircraft noise at these installations may have had minor impacts on property values, it was difficult to quantify those impacts because other factors, such as the quality of the housing near the installations and the local real estate market, had a larger impact on property values. Therefore, the regression analysis was not able to predict the impact of aircraft noise on the property values of two comparable properties.

Another study analyzed 33 other studies attempting to quantify the impact of noise on property values (Nelson, 2003). The study analyzed the property values of similar properties, using one property located near a source of noise, specifically an airport, and one property not located near a source of noise. The result of the study is that, considering all other factors (e.g., neighborhood characteristics and desirability, local real estate market conditions, school districts) as equal, an adverse impact on property values as a result of aircraft noise is possible and estimates that the value of a specific property could be discounted between 0.5 and 0.6 percent per decibel when compared with a similar property that is not impacted by aircraft noise. However, additional indications are that the discount for property values as a result of noise would be higher for noise levels above 75 dB DNL (Nelson, 2003). Under these conditions, it is not expected that the change in noise levels from the F-35 would impact property values or quality of life for residents. However, as discussed in Section 3.3, Noise, the residents affected by the noise levels may be annoyed by overflights. Tourism would not be adversely affected as the highest noise levels are directed away from the beaches and waterways that have the potential for high concentrations of tourists. Therefore, noise levels under the No Action Alternative are not expected to have significant adverse socioeconomic impacts.

Table 3-12. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under the No Action Alternative

Average Noise Levels	Total Affected Off-Base Population	Eglin Main	Duke Field	Choctaw Field
65–69 dB	991	988	1	2
70–74 dB	635	635	0	0
75–79 dB	174	174	0	0
80–84 dB	0	0	0	0
85+ dB	0	0	0	0
Total >65 dB DNL	**1,800**	**1,797**	**1**	**2**

> = greater than; dB = decibels; DNL = day-night average sound level

Environmental Justice

For environmental justice, no disproportionate adverse impacts or risks to children are anticipated as a result of personnel changes or construction activities associated with the beddown of 59 aircraft. Noise has been identified as an adverse impact that could potentially have disproportionate impacts. The only county directly affected by noise levels generated at Eglin Main Base is Okaloosa County. Noise levels generated at Duke Field and Choctaw Field can affect Okaloosa and Santa Rosa Counties. Therefore, those two counties provide the community of comparison for affected populations of minorities, low-income persons, and children under the age of 18.

Table 3-13 summarizes the estimated number of populations of concern affected by noise levels greater than 65 dB DNL under the No Action Alternative. As described for socioeconomics, the environmental justice analysis focuses on off-base residents potentially affected by noise levels greater than 65 dB DNL. Under the No Action Alternative, no populations of concern would be affected in the vicinity of Duke Field or Choctaw Field. Therefore, the analysis for disproportionate impacts from noise is focused on the affected areas near Eglin Main Base, with Okaloosa County providing the community of comparison.

Table 3-13. Affected Populations of Concern Near Eglin Main Base, No Action Alternative

Average Noise Levels	*Minority*		*Low-Income*		*Children*	
	Percent	**Number**	**Percent**	**Number**	**Percent**	**Number**
Total ≥65 dB DNL	21.54%	387	8.18%	147	29.0%	522
65–69 dB DNL	23.08%	228	7.89%	78	31.3%	310
70–74 dB DNL	20.31%	129	8.66%	55	29.2%	185
75–79 dB DNL	17.24%	30	8.05%	14	15.2%	26
80–84 dB DNL	0.00%	0	0.00%	0	0.0%	0
85+ dB DNL	0.00%	0	0.00%	0	0.0%	0

≥ = greater than or equal to; dB = decibels; DNL = day-night average sound level

Noise is not expected to disproportionately impact minority or low-income populations in the vicinity of Eglin Main Base. Minorities compose 22.9 percent of the overall population of Okaloosa County, but only 21.54 percent (387 residents) (Table 3-13) of the total off-base population affected by noise levels above 65 dB DNL. Low-income populations compose nearly 10.6 percent of the overall population of Okaloosa County, but only 8.18 percent (147 residents) of the off-base population affected by noise levels above 65 dB DNL. Since the affected minority and low-income populations are below the total percentage of minority and low-income populations in the community of comparison, disproportionate impacts to minority and low-income populations would not occur (Figure 3-14).

Noise levels would affect children as well as schools and daycares. In Okaloosa County, children under the age of 18 comprised 22.3 percent of the total population in 2010. Under the No Action Alternative, the share of children exposed to noise levels greater than 65 dB DNL would be slightly higher at 29.0 percent. Eglin Elementary School and the First Assembly of God private school would be affected by noise levels between 65 and 75 dB DNL (Figure 3-15). According to a study conducted by the FICUN, noise levels between 65 and 70 dB DNL are compatible with educational services, such as schools, provided that measures are taken to provide NLR in the buildings of 25 dB (FICUN, 1980). Noise levels between 70 and 75 dB DNL are also compatible with educational services, with NLR of 30 dB. Noise levels of 75 dB DNL and above are not considered compatible with educational services. The Childcare Network daycare center would be affected by noise levels between 75 and 79 dB DNL. That facility would not be compatible with these noise levels regardless of NLR. The facilities in noise levels below 75 dB DNL would be compatible with schools or daycares following additional noise attenuation to achieve that compatibility. However, these noise levels would not be compatible with outdoor land use and could increase the risk of hearing loss in children.

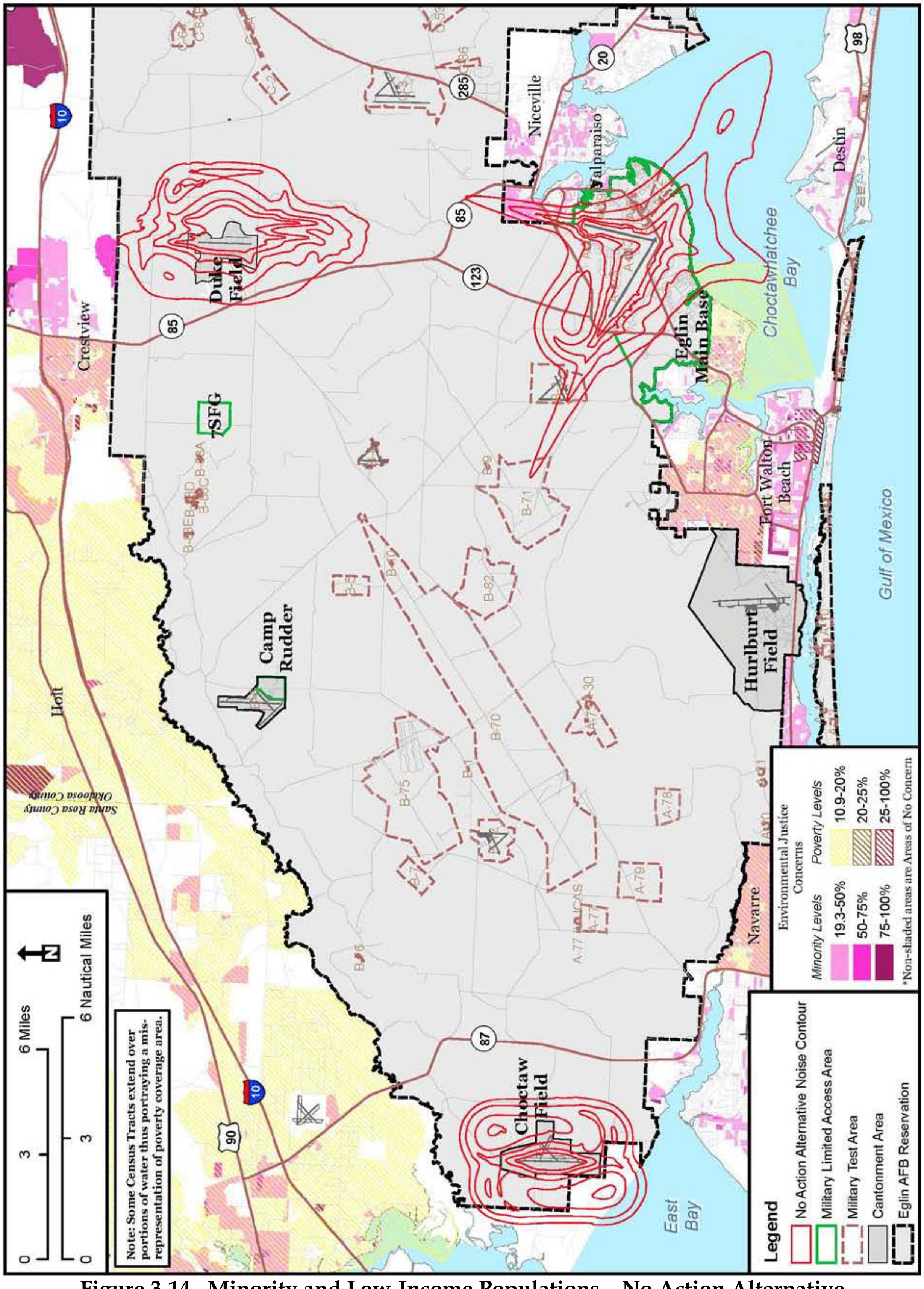


Figure 3-14. Minority and Low-Income Populations – No Action Alternative

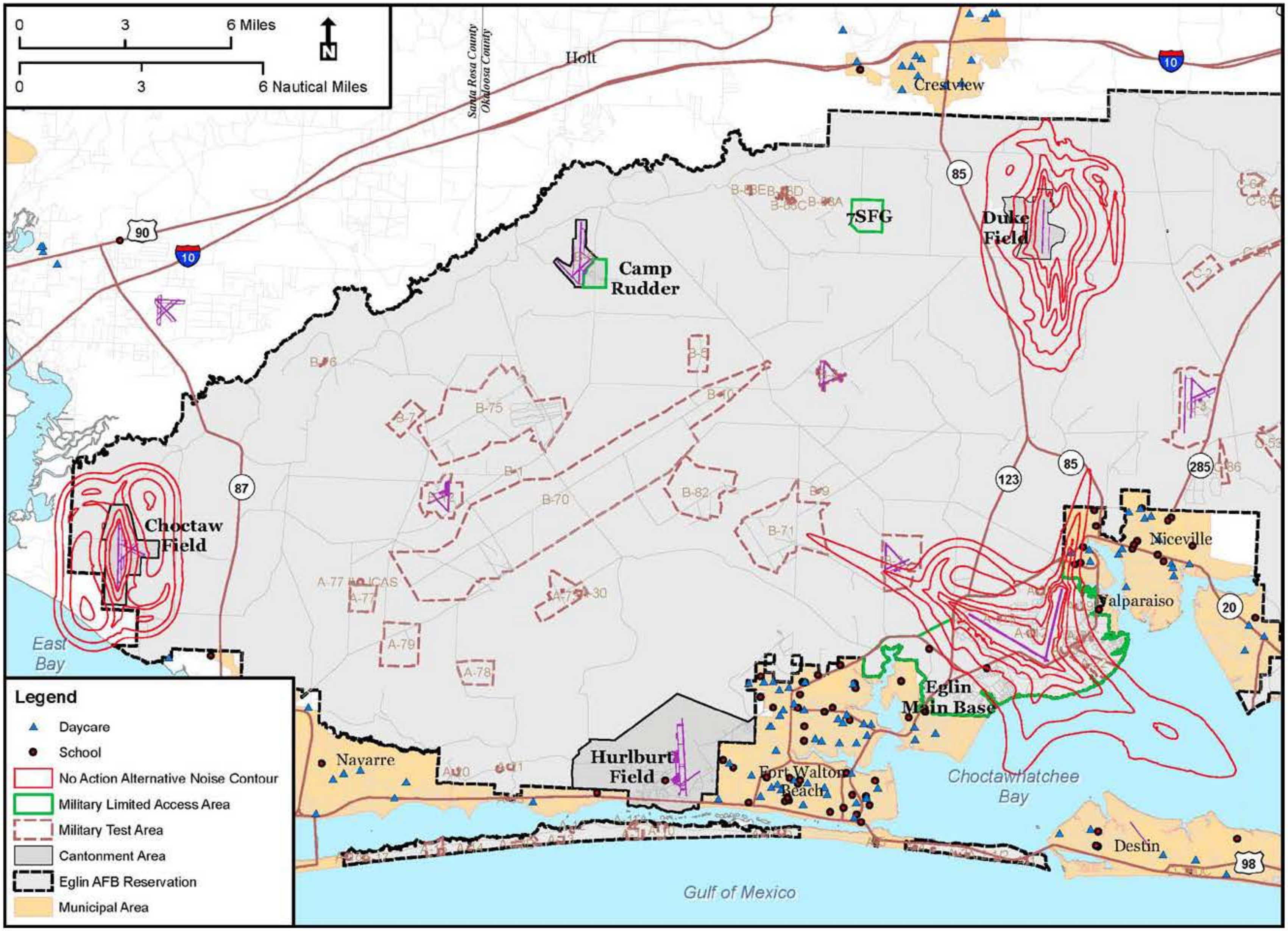


Figure 3-15. Schools and Daycares – No Action Alternative

3.6 TRANSPORTATION

3.6.1 Definition

Transportation is defined as the movement of goods from place to place. In general, transportation refers to air, water, and ground vehicles and the services that make use of these infrastructures. Roadways are an example of a transportation infrastructure for automobiles, trucks, and buses to carry both people and goods.

3.6.2 Region of Influence

Transportation resources analyzed within this SEIS include the regional roadway network adjacent to the airfields proposed for the main beddown of the F-35 aircraft, as outlined in Chapter 2, and the local roadway network within Eglin Main Base gates. Collectively, these resources compose the ROI for transportation.

The Proposed Action alternatives have the potential to affect specific areas of the overall ROI to different degrees, based on their location and access, but there is overlap in the ROI, particularly along the Hwy 85 corridor. For this reason, the ROI is defined as a single general transportation region, which consists of the area surrounding and leading to Eglin Main Base and the area surrounding and leading to Duke Field. The ROI includes roads within Okaloosa and Walton Counties (Figure 3-16).

The key transportation resources generally include Hwy 85, Hwy 285, U.S. Highway (US) 98/Hwy 30, Hwy 20, Hwy 123, Hwy 188, Hwy 393, Hwy 189, Interstate 10 (I-10)/ Hwy 8), US 90/Hwy 10, and Hwy 397, as well as local roadways within Eglin Main Base and Duke Field.

Some of the study area roadways have been designated as part of the Strategic Intermodal System (SIS). The SIS is a statewide network of high-priority transportation facilities, including the state's largest and most significant commercial service airports, the spaceport, deepwater seaports, freight rail terminals, passenger rail and intercity bus terminals, rail corridors, waterways, and highways. SIS facilities in the study area include I-10, Hwy 123, and Hwy 85 (from Hwy 123 to the Okaloosa Regional Airport entrance and from I-10 to Hwy 123). A map of these SIS facilities is included in Appendix B, *Transportation*.

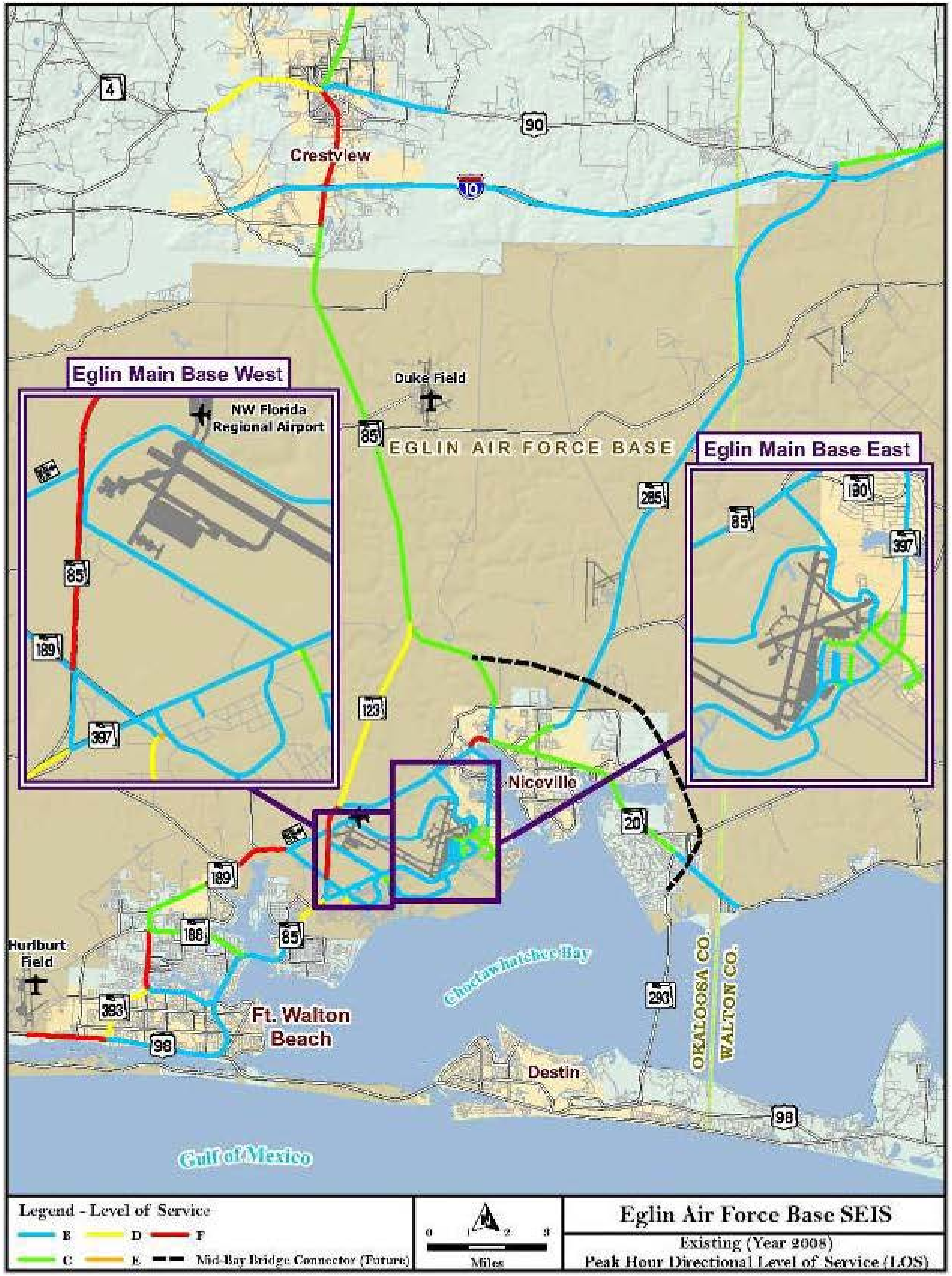


Figure 3-16. Roadway Segments (and Level of Service) as of 2008 in the Region of Influence

3.6.3 Analysis Methodology

An analysis of the regional roadway segments within the ROI was conducted to identify current and future (projected) deficient segments within the existing roadway network, as well as the potential impacts of the proposed alternatives. Generally, data and analysis methods used for this analysis included: an origin-destination survey, Florida Standard Urban Transportation Model Structure, annual average daily traffic, peak-hour, peak-direction traffic, roadway LOS, volume to capacity (v/c) ratio, and significance and adversity. In addition, roadways designated as part of Florida's SIS have also been identified, as more stringent standards apply to these roadways.

A detailed description of the analysis methods utilized to determine impacts to transportation resources is also provided in Appendix B, *Transportation*. Additional information and detail on the methodology for analyzing potential impacts is available in the FEIS.

3.6.4 Laws and Regulations

The Florida *Transportation Uniform Standard Code*, 9J-2.045, Florida Administrative Code (FAC), gives the Florida Department of Community Affairs (DCA) guidance on how they will evaluate transportation facility issues in the review of applications for local government developer orders and Developments of Regional Impacts. The *Transportation Uniform Standard Code* implements, in part, Chapter 380 of the Florida Statutes, Land and Water Management. Chapter 380 is one of the 23 statutes in the state of Florida that compose the Florida Coastal Management Program and is administered by the DCA. The purpose of Chapter 380, Land and Water Management, is to facilitate orderly and well-planned development, by authorizing the state land planning agency to establish land management policies to guide local decisions relating to growth and development. As Eglin AFB could submit a federal consistency review under the Coastal Zone Management Act (CZMA) for the BRAC actions, potential impacts to the regional transportation network, as well as to the public, could be reviewed by the DCA.

3.6.5 No Action Alternative Consequences

The analysis was updated from the FEIS to 2008 conditions and incorporated improvements to the regional roadway network as described in the FEIS's Transportation appendix. Improvements that were/are under construction were considered to be part of the No Action Alternative. Based on this analysis, eight roadway segments are currently (2008) operating in a deficient condition. This SEIS's Appendix B, *Transportation*, shows the existing LOS as well as future (2016 and 2021) LOS for all study area roadways.

Table 3-14 and Table 3-15 contain the results of the roadway analysis for the No Action Alternative for 2016 and 2021, respectively. The analysis identifies any roadway segment that is projected to operate deficiently (i.e., worse than the adopted local government LOS standard). The tables include a v/c ratio, which indicates how well the roadway operates relative to the maximum service volume associated with the adopted standard. The 2016 and 2021 roadway LOS are shown in Figure 3-17 and Figure 3-18, respectively, for the No Action Alternative.

The results indicate that, under the No Action Alternative, 21 and 24 roadway segments would operate deficiently with respect to the adopted LOS standard in the peak-hour, peak-direction analysis in 2016 and 2021, respectively.

Table 3-14. No Action Alternative 2016 Peak-Hour, Peak-Direction Level of Service Analysis

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008				2016 No Action Alternative			
					Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?
Boatner Road												
Hatchee Rd to Hospital	2	0.23	E	507	500	E	0.99		550	F	1.08	Yes
Nomad Way												
Pumphouse to Florida Hwy 397 (Eglin Blvd/John Sims Pkwy)	2	0.85	E	720	250	B	0.35		1,000	F	1.39	Yes
Hwy 10 (US 90)												
Hwy 85 to Antioch Road	4	0.65	D	1,600	1,300	D	0.81		1,900	F	1.19	Yes
Hwy 20												
Hwy 85 to Hwy 285 (N Partin Dr)	6	0.78	D	2,940	2,600	C	0.88		3,000	F	1.02	Yes
Hwy 285 (N Partin Dr) to Rocky Bayou Bridge	4	2.60	D	1,960	1,800	C	0.92		2,000	F	1.02	Yes
Rocky Bayou Bridge to Hwy 293 (White Point Rd)	4	2.10	D	1,960	1,700	C	0.87		2,000	F	1.02	Yes
Hwy 30 (US 98)												
Hwy 85 to Hwy 393 (Mary Esther Boulevard)	4	3.02	D	1,960	1,500	B	0.77		2,100	F	1.07	Yes
Hwy 393 (Mary Esther Boulevard) to Hurlburt Field Gate	4	2.70	D	1,960	2,300	F	1.17	Yes	2,400	F	1.22	Yes
Hwy 85												
Hwy 10 (US 90) to Hwy 8 (I-10)	4	2.17	D	1,600	1,900	F	1.19	Yes	2,700	F	1.69	Yes
Hwy 8 (I-10) to PJ Adams Pkwy	4	0.95	C	1,210	2,200	F	1.82	Yes	3,200	F	2.64	Yes
PJ Adams Rd to Duke Field	4	5.21	C	2,560	2,100	C	0.82		2,900	D	1.13	Yes
Hwy 20 to Hwy 397 (John Sims Pkwy)	6	0.68	D	2,720	2,900	F	1.07	Yes	3,400	F	1.25	Yes
Hwy 123 to ACC Gate at Nomad Way[+]	4	1.05	D	1,960	2,400	F	1.22	Yes	2,600	F	1.33	Yes
ACC Gate at Nomad Way to Hwy 189 (Lewis Turner Blvd)	4	0.94	D	1,800	2,200	F	1.22	Yes	2,200	F	1.22	Yes
Hwy 189/Hwy 397 (Eglin Blvd) to 12th Avenue	4	1.36	Note*	1,800	1,700	D	0.94		2,200	F	1.22	Yes
Hwy 123												
Hwy 85 to Hwy 85N	2	5.00	D	1,120	1,000	D	0.89		1,100	D	0.98	Yes

Table 3-14. No Action Alternative 2016 Peak-Hour, Peak-Direction Level of Service Analysis, Cont'd

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008				2016 No Action Alternative			
					Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?
Hwy 188 (Racetrack Road)												
Hwy 189 (Beal Pkwy) to Hwy 85	4	2.60	D	1,960	1,700	C	0.87		2,100	F	1.07	Yes
General Bond Blvd to Mooney Rd	4	2.31	E	1,960	2,300	F	1.17	Yes	3,100	F	1.58	Yes
Mooney Rd to Hwy 188 (Racetrack Rd)	4	2.10	D	1,960	1,700	C	0.87		2,100	F	1.07	Yes
Hwy 188 (Racetrack Rd) to Hwy 393 (Mary Esther Blvd)	4	1.50	D	1,770	2,200	F	1.24	Yes	2,400	F	1.36	Yes
Hwy 285												
Hwy 10 (US 90) to Okaloosa/Walton County Line	2	6.76	C	800	400	B	0.50		1,200	E	1.50	Yes
Hwy 393 (Mary Esther Boulevard)												
Hwy 189 to Hwy 30 (US 98)	4	1.84	D	1,770	1,400	D	0.79		2,300	F	1.30	Yes

ACC = Air Combat Command; Blvd = boulevard; Dir = direction; Hwy = Florida Highway; LOS = level of service; Pk = peak; Rd = Road; US = U.S. Highway; v/c = volume to capacity; Vol = volume

* Policy constrained in the Comprehensive Plan. Capacities are consistent with the Congestion Management System.

+ Hwy 85 has been widened to six lanes from south of Hwy 123 to the airport entrance/exit. Updated count and capacity are based on four lanes where the updated count was provided.

1. The v/c ratio was calculated from daily adopted level of service standard.

Table 3-15. No Action Alternative 2021 Peak-Hour, Peak-Direction Level of Service Analysis

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008				2021 No Action Alternative			
					Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?
Boatner Road												
Hatchee Rd to Hospital	2	0.23	E	507	500	E	0.99		550	F	1.08	Yes
Nomad Way												
Pumphouse to Hwy 397 (Eglin Blvd/John Sims Pkwy)	2	0.85	E	720	250	B	0.35		1,300	F	1.81	Yes
Hwy 10 (US 90)												
Hwy 85 to Antioch Road	4	0.65	D	1,600	1,300	D	0.81		2,000	F	1.25	Yes
Hwy 20												
Hwy 85 to Hwy 285 (N Partin Dr)	6	0.78	D	2,940	2,600	C	0.88		3,000	F	1.02	Yes
Hwy 285 (N Partin Dr) to Rocky Bayou Bridge	4	2.60	D	1,960	1,800	C	0.92		2,000	F	1.02	Yes
Rocky Bayou Bridge to Hwy 293 (White Point Rd)	4	2.10	D	1,960	1,700	C	0.87		2,000	F	1.02	Yes
Hwy 30 (US 98)												
Hwy 85 to Hwy 393 (Mary Esther Boulevard)	4	3.02	D	1,960	1,500	B	0.77		2,300	F	1.17	Yes
Hwy 393 (Mary Esther Boulevard) to Hurlburt Field Gate	4	2.70	D	1,960	2,300	F	1.17	Yes	2,600	F	1.33	Yes

Table 3-15. No Action Alternative 2021 Peak-Hour, Peak-Direction Level of Service Analysis, Cont'd

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008				2021 No Action Alternative			
					Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?
Hwy 85												
Hwy 10 (US 90) to Hwy 8 (I-10)	4	2.17	D	1,600	1,900	F	1.19	Yes	2,900	F	1.81	Yes
Hwy 8 (I-10) to PJ Adams Pkwy	4	0.95	C	1,210	2,200	F	1.82	Yes	3,600	F	2.98	Yes
PJ Adams Rd to Duke Field	4	5.21	C	2,560	2,100	C	0.82		3,000	D	1.17	Yes
Hwy 20 to Hwy 397 (John Sims Pkwy)	6	0.68	D	2,720	2,900	F	1.07	Yes	3,400	F	1.25	Yes
Hwy 123 to ACC Gate at Nomad Way+	4	1.05	D	1,960	2,400	F	1.22	Yes	2,700	F	1.38	Yes
ACC Gate at Nomad Way to Hwy 189 (Lewis Turner Blvd)	4	0.94	D	1,800	2,200	F	1.22	Yes	2,400	F	1.33	Yes
Hwy 189/Hwy 397 (Eglin Blvd) to 12th Avenue	4	1.36	Note*	1,800	1,700	D	0.94	Yes	2,400	F	1.33	Yes
Hwy 188 (Racetrack Rd) to Hwy 30 (US 98)	6	2.96	Note*	2,940	2,100	B	0.71		3,100	F	1.05	Yes
Hwy 123												
Hwy 85 to Hwy 85N	2	5.00	D	1,120	1,000	D	0.89		1,200	E	1.07	Yes
Hwy 188 (Racetrack Road)												
Hwy 189 (Beal Pkwy) to Hwy 85	4	2.60	D	1,960	1,700	C	0.87		2,100	F	1.07	Yes
Hwy 189												
General Bond Blvd to Mooney Rd	4	2.31	E	1,960	2,300	F	1.17	Yes	3,200	F	1.63	Yes
Mooney Rd to Hwy 188 (Racetrack Rd)	4	2.10	D	1,960	1,700	C	0.87		2,200	F	1.12	Yes
Hwy 188 (Racetrack Rd) to Hwy 393 (Mary Esther Blvd)	4	1.50	D	1,770	2,200	F	1.24	Yes	2,400	F	1.36	Yes
Hwy 285												
Hwy 10 (US 90) to Okaloosa/Walton County Line	2	6.76	C	800	400	B	0.50		1,300	E	1.63	Yes
Hwy 393 (Mary Esther Boulevard)												
Hwy 189 to Hwy 30 (US 98)	4	1.84	D	1,770	1,400	D	0.79		2,500	F	1.41	Yes
Hwy 397 (Eglin Boulevard/John Sims Parkway)												
Museum Dr/Nomad Way to Hwy 189 (Lewis Turner Blvd)/West Gate	4	1.10	D	1,800	700	B	0.39		2,000	F	1.11	Yes

ACC = Air Combat Command; Blvd = Boulevard; Dir = direction; Hwy = Florida Highway; LOS = level of service; Pk = peak; US = U.S. Highway; v/c = volume to capacity; Vol = volume

* Policy constrained in the Comprehensive Plan. Capacities are consistent with the Congestion Management System.

+ Hwy 85 has been widened to 6 lanes from south of Hwy 123 to the airport entrance/exit. Updated count and capacity are based on 4 lanes where the updated count was provided.

1. The v/c ratio was calculated from daily adopted level of service standard.

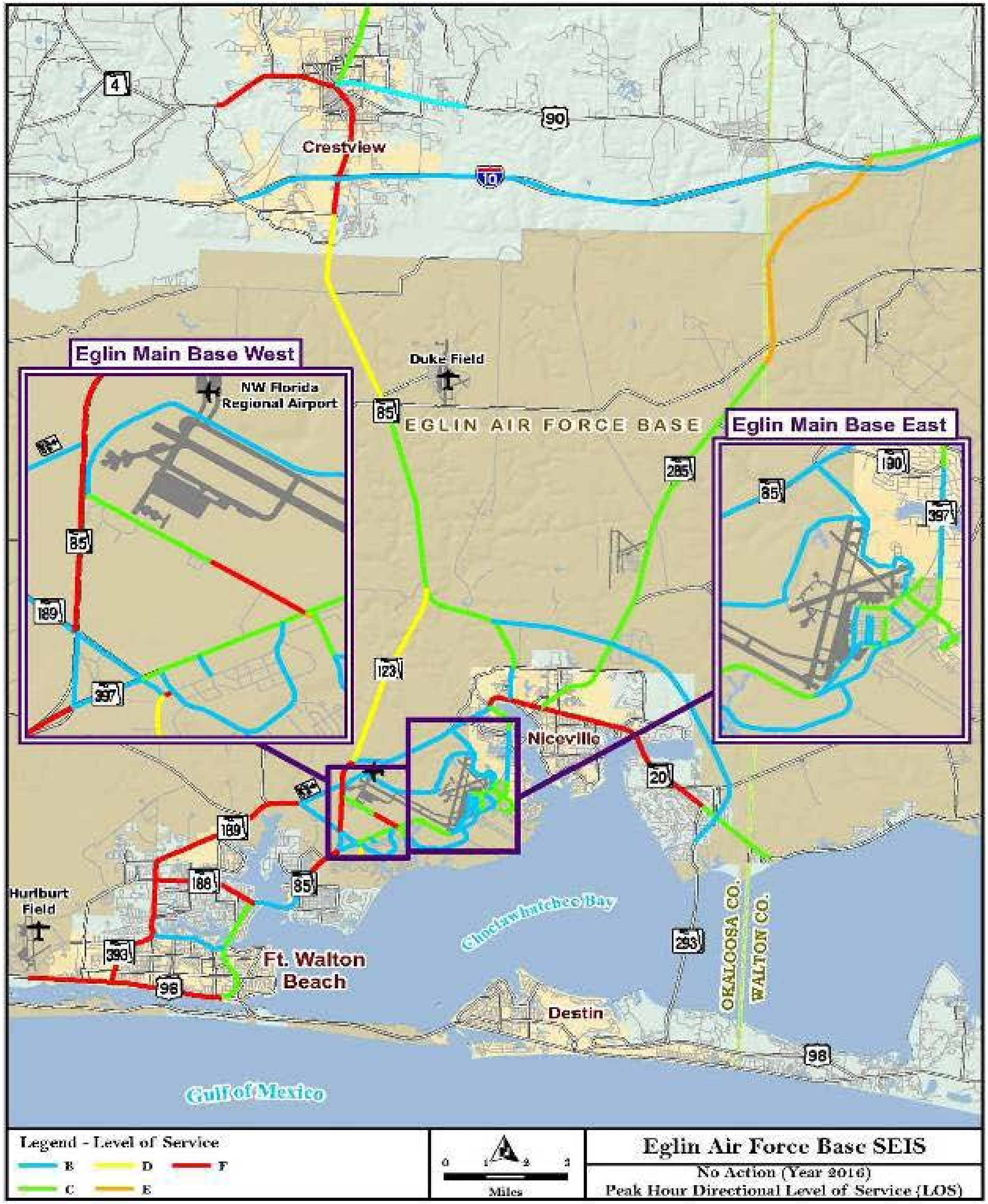


Figure 3-17. No Action Alternative – 2016 Roadway Peak-Hour Peak-Direction LOS

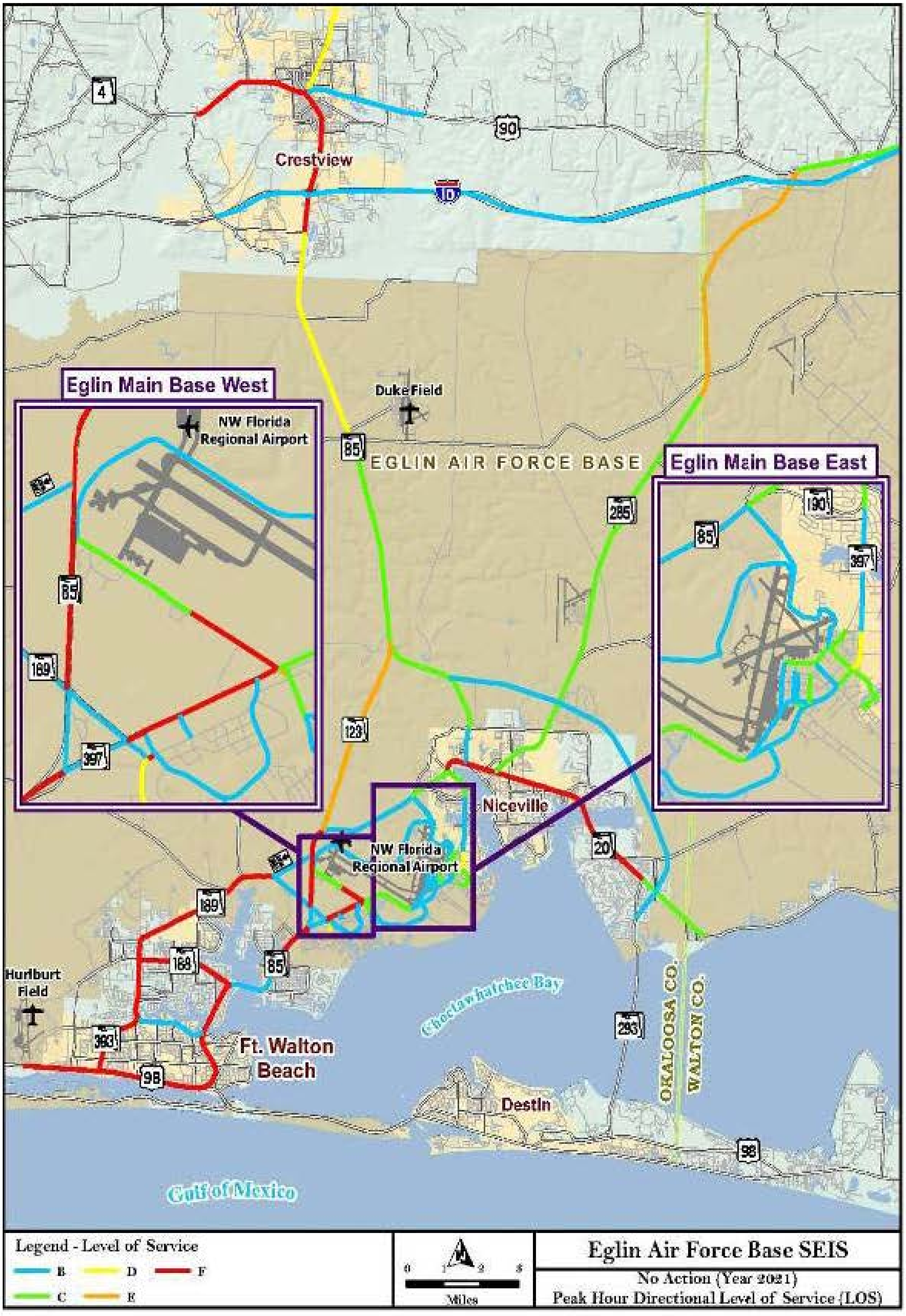


Figure 3-18. No Action Alternative – 2021 Roadway Peak-Hour Peak-Direction LOS

3.7 UTILITIES

3.7.1 Definition

The utilities described include potable water, wastewater, electricity, and natural gas. Water that is drinkable by humans is referred to as potable water and wastewater is water that has been used and contains dissolved or suspended waste materials. Additional descriptions of each utility are available in FEIS, Section 3.6, Utilities.

3.7.2 Region of Influence

The ROI is Eglin Main Base. The existing conditions of each utility focuses on the existing infrastructure (e.g., wells, water systems, wastewater treatment plants [WWTPs]), current utility use, and any pre-defined capacity or limitations as set forth in permits or regulations. The land area beneath the airspaces and MTRs are not included in the ROI, as there would be no utility usage and, therefore, no impacts to utilities.

Potable Water

The Housing Area water system on Eglin Main Base (Figure 3-19) would be used to support potable water needs under the Eglin Main Base alternative options.

The amount of potable water currently drawn from the Floridan Aquifer is less than the levels permitted by the Consumptive Use Permit authorization for Eglin Main Base (Table 3-16). As demand increases with the influx of additional people and military missions to Eglin AFB, future considerations for the potable water supply may require developing additional water systems and Consumptive Use Permits, making changes to reduce water consumption, and identifying areas of dependence on the aquifer (Brown, 2006a).

Table 3-16. Permitted and Actual Potable Water Use on Eglin Main Base

Water Supply System	Permitted Average Daily Limit (gal/day)	Permitted Maximum Daily Limit (gal/day)	Permitted Maximum Monthly Limit (gal/month)	2011 Average Daily Rate (gal/day)	2011 Average Monthly Rate (gal/month)
Main Base/ Ammo	1.7 million	4.0 million	91.0 million	600,392	18.26 million
Eglin Main Housing Area	1.92 million	4.99 million	120 million	756,442	23.01 million

Source: Adams, 2012; gal = gallons

Wastewater

The Plew Heights and Eglin Main Wastewater Treatment Facilities provide services to Eglin Main and surrounding facilities. These facilities (Figure 3-19) maintain adequate supplies and are capable of meeting an increased demand. As detailed in Table 3-17, Eglin AFB has the potential capacity for almost three times the growth.

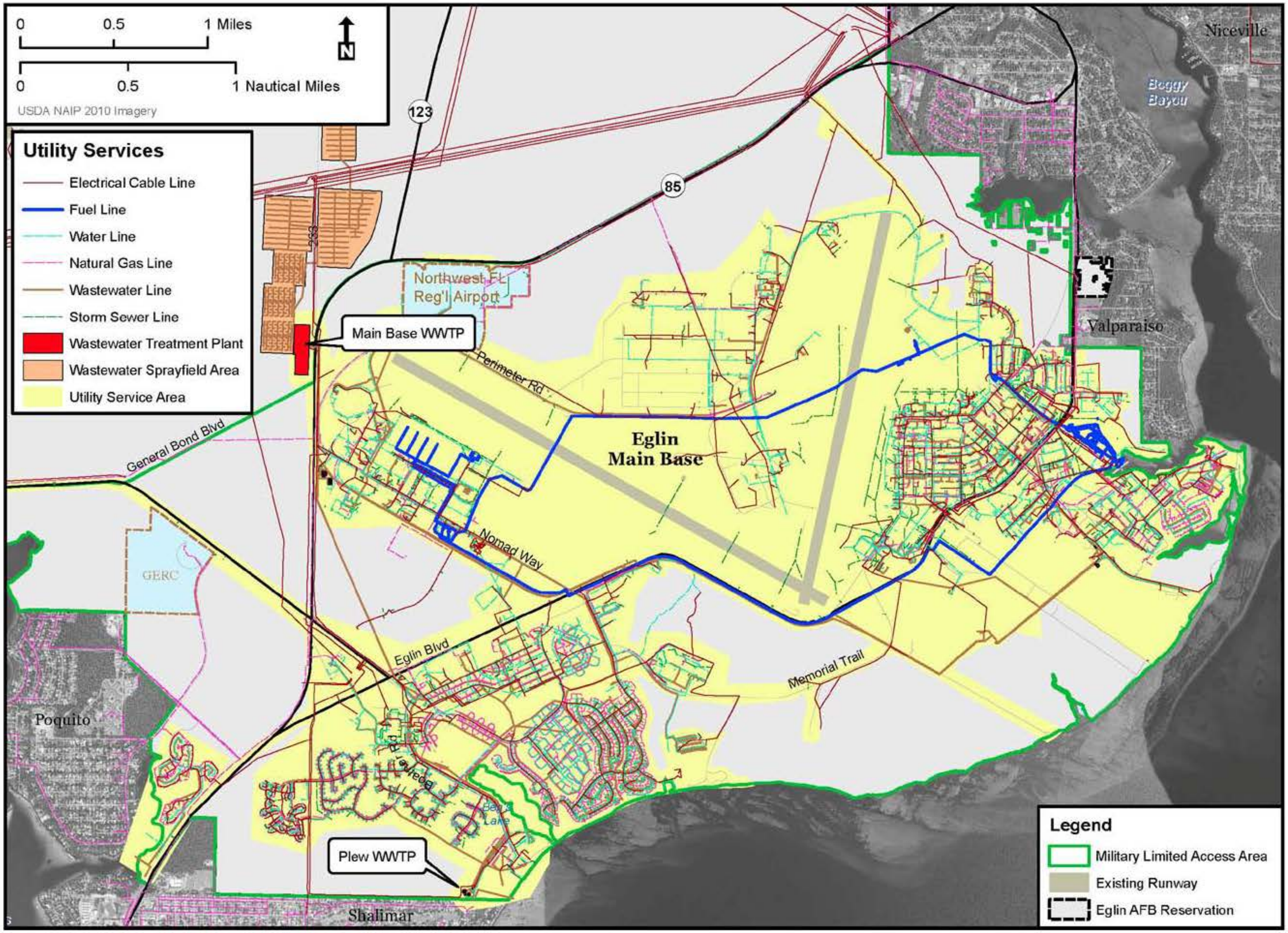


Figure 3-19. Eglin Main Utilities

The Arbennie Pritchett Water Reclamation Facility (WRF) is a new WWTP that supplies services to most of Okaloosa County. This facility is located on Eglin property and is leased by the county. The Arbennie Pritchett WRF replaces the Garnier WWTP, which is being demolished with plans to build a park on the former premises. Although this new WRF, which has a capacity to process 10 million gallons per day (mgd), is not used by Eglin (Table 3-17), the potential exists (Okaloosa County Water and Sewer Department (OCWSD), 2007; OCWSD, 2009).

Table 3-17. Wastewater Treatment Plant Capacities

WWTP Location	Permitted Capacity (mgd)*	Annual Average (mgd)*	Percentage of Capacity Used*	Areas Served by WWTP
Plew Heights Treatment Facility	1.5	0.258	17.2	Main Base housing, 33 FW, munitions storage area
Main Base Treatment Facility	1.0	0.329	32.9	Main Base area east of the flight line

*Data as of November 2011
Source: Brown, 2012
FW = Fighter Wing; mgd = million gallons per day; WWTP = wastewater treatment plant

Electricity and Natural Gas

Electricity usage on Eglin AFB has been steady from fiscal year (FY) 2000 through FY 2011 (Table 3-18). The electrical infrastructure on Eglin Main Base is extensive (Figure 3-19), and Gulf Power supplies transmission voltage electricity to Eglin Main Base via a primary meter. Two substations on Eglin track usage, regulate flow, and distribute electricity to Eglin Main Base, Duke Field, and portions of the Eglin Range (Fleming, 2006; McBay, 2007).

Table 3-18. Electricity Consumption from 2000–2011 for Eglin AFB[1]

Fiscal Year	Total electric consumption (kWh)
2000	265,650,513
2001	252,823,920
2002	271,832,920
2003	263,271,716
2004	261,955,624
2005	278,051,532
2006	269,711,844
2007	265,633,477
2008	245,647,000
2009	245,647,000
2010	245,573,596
2011	232,001,258

Source: Fleming, 2012
AFB = Air Force Base; kWh = kilowatt hours
1. Electricity consumption data include Eglin Main Base, Duke Field, and the Eglin Range.

The rate of natural gas consumption at Eglin AFB has gradually increased over the last 12 years, with usage ranging between 325,000 and 430,000 million cubic feet (MCF), except from FY 2005 to FY 2006 when usage was below 300,000 MCF (Table 3-19). The theoretical capacity of the gas pipeline into Eglin is a maximum throughput in excess of 68,000 MCF per day. The total base demand for natural gas in FY 2011 was approximately 413,891 MCF or 1,134 MCF per day. Infrastructure currently exists on Eglin Main Base (Figure 3-19), Duke Field cantonment, and at the Navy Explosive Ordnance Disposal (EOD) School at D-51 on the Eglin Range. Two main metering points for natural gas regulate the flow on Eglin Main Base and out to Duke Field and the Navy EOD School (Fleming, 2006).

Table 3-19. Natural Gas Consumption from 2000–2011 for Eglin AFB[1]

Fiscal Year	Grand Total Consumption (MCF)
2000	326,256
2001	366,888
2002	334,052
2003	347,591
2004	350,290
2005	292,840
2006	234,734
2007	423,008
2008	351,505
2009	395,803
2010	428,019
2011	413,891

Source: Fleming, 2012
AFB = Air Force Base; MCF = million cubic feet
1. Natural gas consumption data include Eglin Main Base, Duke Field, and D-51 (Navy EOD School).

3.7.3 Analysis Methodology

The context and intensity for each proposed JSF alternative was used to quantify potential consequences upon the various types of utilities. A comparison is made between the amount of the utility being used, regulatory limitations on consumption, and how implementation of each alternative would affect those factors. A detailed description of all of the data and analysis methods utilized to determine impacts to utilities is also provided in Appendix C, *Utilities*. Additional information and detail on the methodology for analyzing potential impacts is available in the FEIS.

3.7.4 Laws and Regulations

Water

The Florida Department of Environmental Protection (FDEP) regulates potable water supply systems in Florida. The Florida Safe Drinking Water Act and FDEP rules have incorporated federal primary and secondary drinking water standards as identified in the Safe Drinking Water Act (42 USC 201, 300 et seq.) and the National Primary Drinking Water Regulations. A public water supply system is classified by the FDEP as a system that has at least 15 service connections or regularly serves 25 individuals daily for at least 60 days of the year. The Florida Water Resources Act (Florida Statutes, Title 28 Section 373) requires a comprehensive approach to water management based on regional hydrological boundaries. The Act also provides for the creation of five regional water management districts; Eglin AFB is within one of these five districts: the Northwest Florida Water Management District.

Wastewater

The Clean Water Act (CWA) (33 USC 1151 et seq., 1251 et seq.) is the basic federal legislation governing wastewater discharges. The implementing federal regulations include the National Pollutant Discharge Elimination System (NPDES) permitting process (40 CFR Part 122), general pretreatment programs (40 CFR 403), and categorical effluent limitations, including limitations for pretreatment of direct discharges (40 CFR 405, et seq.).

The Florida Air and Water Pollution Control Act (Florida Statutes, Title 28 Section 403) governs industrial and domestic wastewater discharges in the state. The implementing state regulations are contained in FAC 62. These regulations establish water quality standards, regulate domestic wastewater facility management and industrial waste treatment, establish domestic WWTP monitoring requirements, and regulate stormwater discharge.

Electricity and Natural Gas

There are no specific regulations associated with electrical or natural gas infrastructure or supply.

3.7.5 No Action Alternative Consequences

Potable Water

Under the No Action Alternative, the housing area water system would be used to support the JSF. The JSF will use approximately 573,000 gallons of water per day, or 209 million gallons per year. The permitted average daily limit of the housing area potable water system is 1.92 mgd with a maximum daily limit of 4.99 mgd (Table 3-20). The average consumption of potable water from the housing area water system in 2011 was 0.756 mgd per day. With the addition of 0.573 mgd anticipated from the JSF, the housing area water system would reach approximately 1.3 mgd, which is still within permit limits. Since the housing area water system would remain within permitted limits, there would be no adverse impact on potable water under the No Action Alternative.

Table 3-20. No Action Alternative: Housing Area Water System Capacity

Alternative	2011 Average Daily Rate (mgd)	JSF Estimated Average Daily Rate (mgd)	Total Average Daily Rate (mgd)*	Permitted Average Daily Limit (mgd)	Permitted Maximum Daily Limit (mgd)
No Action	0.756	0.573	1.3	1.92	4.99

mgd = million gallons per day
*Total Average Daily Rate = 2011 average daily rate + JSF program estimated average daily rate

Potable water estimates and impacts are based on numbers of personnel. However, the freshwater aircraft rinses and aircraft wash rack would also draw water from the Floridan Aquifer. This type of water use is classified as industrial water use. To quantify industrial water use on Eglin Main Base and to identify ways to reduce it, Eglin completed the *Main Base Industrial Water Use Survey* in December 2007. The survey determined that industrial water use accounts for only 1.73 percent of the five-year annual average for total water use on Eglin Main Base (Eglin AFB, 2007). The primary water uses drawing from the Floridan Aquifer on Eglin AFB are public water supply and cooling towers, accounting for 71 percent and 27 percent, respectively, of total water use.

Of the total *industrial* water uses on Eglin Main Base, equipment washing/rinsing (vehicles and aircraft) accounts for 19 percent of the total, and equipment processes (metal finishing operations, x-ray machines, and the cooling tower at McKinley Climatic Lab) account for the remaining 81 percent of the total. The 33 FW, which operated F-15 jet aircraft, utilized approximately 236,400 gallons per year for aircraft washing and rinsing.

Approximately four times as many F-35 aircraft would be washed on an annual basis under the No Action Alternative, which would increase the amount of water used per year for aircraft washing and rinsing to approximately 780,000 gallons. With the fourfold increase in water use for F-35 aircraft washing and rinsing, industrial water use would account for 1.96 percent of the five-year annual average of total water use on Eglin Main Base, up from 1.73 percent.

The *Main Base Industrial Water Use Survey* identified several opportunities for reducing industrial water usage. Of all the opportunities evaluated to reduce industrial water use, the utilization of the Sand and Gravel Aquifer for aircraft washing and rinsing would have the most impact on the JSF IJTS. However, it was determined that use of the Sand and Gravel Aquifer would not be feasible due to water quality limits established by Air Force Technical Order 1-1-691, Section 3.1.1-f for washing and rinsing aircraft. These limits would require water from the Sand and Gravel Aquifer to be treated and monitored before use on aircraft. Due to the level of effort this would require, it was excluded as a method for reducing Floridan Aquifer water use for aircraft washing and rinsing (Eglin AFB, 2007).

Even though the proposed JSF aircraft wash rack and rinses would continue to utilize the Floridan Aquifer, there would be no significant impact on potable water since this type of industrial water use accounts for such a small percentage of the overall potable water use of the Floridan Aquifer by Eglin Main Base.

Wastewater

The JSF IJTS is estimated to produce 91,272 gallons of wastewater per day or 33.3 million gallons per year (Table 3-21) under the No Action Alternative. The rinse water resulting from the two freshwater aircraft rinses would be allowed to be absorbed directly into the ground without first being processed by a wastewater treatment facility (Brown, 2006b). An estimate for the rinses is still included to account for the potential of some water ending up in the wastewater stream. However, the wastewater calculation assumes all the rinsewater enters the wastewater stream, thereby providing a conservative estimate (Brown, 2006b).

Table 3-21. No Action Alternative: Estimated Wastewater Flow

Generalized Activity	Number of People	Wastewater Produced per Person (gal/day)	Total Wastewater Produced (gal/day)
Working (office & industrial)	2,481	13	32,253
Living (dormitory)	732	40	29,280
Eating 3 meals/day (dining hall)	732	21	15,372
Eating 1 meal/day (dining hall)	1,749	7	12,243
		Total (gal/day)	**89,148**
Aircraft Wash Rack	59 (aircraft)	36 (per aircraft)	2,124
		Total (gal/day)	**2,124**
		Grand Total (gal/day)	**91,272**

gal/day = gallons per day

The JSF will be supported by the 33 FW, which uses both the Plew Heights and Eglin Main Base WWTPs. The current wastewater input to the Plew Heights and Eglin Main Base WWTPs consumes less than 20 and 35 percent of the total permitted capacity, respectively. With the conservative estimate that all additional wastewater from the JSF IJTS (91,272 gallons per day) would only be treated at either the Plew Heights WWTP or the Eglin Main Base WWTP, the annual averages would increase to either 0.35 mgd at the Plew Heights WWTP or 0.42 mgd at the Eglin Main Base WWTP. This would result in approximately 23 and 42 percent of the total permitted capacity being utilized at Plew Heights and Eglin Main Base WWTPs, respectively (Table 3-22). Neither WWTP would have difficulty accommodating the additional flow from the JSF on its own, and impacts would be further reduced with the utilization of both WWTPs. Therefore, there would not be any adverse impacts as a result of implementing the No Action Alternative.

Table 3-22. No Action Alternative: WWTP Capacity

WWTP Location	Annual Average Including JSF (mgd)	Permitted Capacity (mgd)	Percentage of Capacity Used
Plew Heights	0.35	1.5	23
Eglin Main Base	0.42	1.0	42

JSF = Joint Strike Fighter; mgd = million gallons per day; WWTP = wastewater treatment plant

Electricity and Natural Gas

Based on the amount of new square footage to be constructed for JSF facilities, it is estimated that the electrical requirement would be approximately 11,560,000 kilowatt hours (kWh) per year or 31,671 kWh per day, and the natural gas requirement would be approximately 16,541 MCF per year or 45 MCF per day. Based on FY 2011 usage, the estimated requirement to support the new JSF facilities would be 4.7 percent of the total usage in 2011 for electricity and 3.8 percent of the total usage for natural gas (Table 3-23). The increased consumption of natural gas is well within the current theoretical capacity of the gas pipeline, serving Eglin Main Base (68,000 MCF per day, or 24,820,000 MCF per year).

Table 3-23. No Action Alternative: Electric and Natural Gas Annual Consumption

Source	Eglin AFB Total Consumption 2011	Estimated Annual JSF Consumption	Total	Percent Increase
Electricity (kWh)	232,001,258	11,560,000	243,561,258	4.7
Natural Gas (MCF)	413,891	16,541	430,432	3.8

AFB = Air Force Base; JSF = Joint Strike Fighter; kWh = kilowatt hours; MCF = million cubic feet

3.8 AIR QUALITY

3.8.1 Definition

Criteria Pollutants

Air quality is determined by the type and concentration of pollutants in the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The severity or nonseverity of a pollutant's concentration in a region or geographical area is determined by comparing it to federal and/or state ambient air quality standards. Under the authority of the Clean Air Act (CAA), the USEPA has established nationwide air quality standards to protect public health and welfare, with an adequate margin of safety.

Greenhouse Gases

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions are generated by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. The U.S. Global Change Research Program report *Global Climate Change Impacts in the United States* states the following:

> Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is due primarily to human-induced emissions of heat-trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities.
>
> Warming over this century is projected to be considerably greater than over the last century. The global average temperature since 1900 has risen by about 1.5 degrees Fahrenheit (ºF). By 2100, it is projected to rise another 2 to 11.5ºF. The U.S. average temperature has risen by a comparable amount and is very likely to rise more than the global average over this century, with some variation from place to place. Several factors will determine future temperature increases. Increases at the lower end of this range are more likely if global heat-trapping gas emissions are cut substantially. If emissions continue to rise at or near current rates, temperature increases are more likely to be near the upper end of the range. Volcanic eruptions or other natural variations could temporarily counteract some of the human-induced warming, slowing the rise in global temperature, but these effects would only last a few years.
>
> Reducing emissions of carbon dioxide (CO_2) would lessen warming over this century and beyond. Sizable early cuts in emissions would significantly reduce the pace and the overall amount of climate change. Earlier cuts in emissions would have a greater effect in reducing climate change than comparable reductions made later. In addition, reducing emissions of some shorter-lived heat-trapping gases, such as methane (CH_4), and some types of particles, such as soot, would begin to reduce warming within weeks to decades.
>
> Climate-related changes have already been observed globally and in the United States. These include increases in air and water temperatures, reduced frost days, increased frequency and intensity of heavy downpours, a rise in sea level, and reduced snow cover, glaciers, permafrost, and sea ice. A longer ice-free period on lakes and rivers, lengthening of the growing season, and increased water vapor in the atmosphere have also been observed. Over the past 30 years, temperatures have risen faster in winter than in any other season, with average winter temperatures in the Midwest and northern Great Plains increasing more

than 7°F. Some of the changes have been faster than previous assessments had suggested.

These climate-related changes are expected to continue while new ones develop. Likely future changes for the United States and surrounding coastal waters include more intense hurricanes with related increases in wind, rain, and storm surges (but not necessarily an increase in the number of these storms that make landfall), as well as drier conditions in the Southwest and Caribbean. These changes will affect human health, water supply, agriculture, coastal areas, and many other aspects of society and the natural environment. (Karl et al., 2009).

While regional and state impacts are more difficult to predict than large regional or global impacts, a report by the Florida Governor's Action Team on Energy and Climate Change (2012) says that regional models indicate the following possible impacts in the state of Florida:

- Sea level rise could lead to flooding of low-lying areas, erosion of beaches, loss of coastal wetlands, intrusion of salt water into water supplies, and increased vulnerability of coastal areas to storms and hurricanes.
- As climate changes, this could cause some plants and animals to go extinct, some to decline or increase in population, and others migrate to areas with more favorable conditions. For example, along the coast, fish that need colder temperatures to survive could migrate north, while more tropical varieties could move up the coast into Florida.
- Diseases and pests with current tropical ranges could invade Florida, as have West Nile virus and Africanized honey bees in Florida's panhandle.
- Crops and trees that need cooler climates may not grow as well in Florida, while more tropical varieties might do better.
- More severe storms and droughts could affect crop production, pests, and growth rates.

GHGs include water vapor, CO_2, CH_4, nitrous oxide (N_2O), ozone (O_3), and several hydrocarbons (HCs) and chlorofluorocarbons (CFCs). Each GHG has an estimated global warming potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the Earth's surface. The GWP of a particular gas provides a relative basis for calculating its carbon dioxide equivalent (CO_2-e) or the amount of CO_2 that emissions of that gas would be equal to. CO_2 has a GWP of 1, and is, therefore, the standard by which all other GHGs are measured.

3.8.2 Region of Influence

Criteria Pollutants

For this analysis Okaloosa, Santa Rosa, Walton, Escambia, and Bay Counties are the chosen ROI in which air emissions from JSF activities would occur. As all of the alternative options would occur within the same ROI there would not be any difference in the affected environment discussion. Table 3-24 illustrates the existing conditions for the ROI. A General Conformity Determination is not required because all areas covered by the Proposed Action are attainment areas for all criteria pollutants (CAA Section 176(c); 42 USC 7506(c)). While additional flight operations would occur in the additional airspace areas discussed in Section 2.3.1.2, these operations would be relatively limited, and a large percentage of the flying would occur above the mixing layer at 3,000 feet AGL. The impacts to regional air quality are expected to be limited and minor. Therefore, those areas were not analyzed in detail.

Table 3-24. Emissions Inventory for Okaloosa, Santa Rosa, Walton, Escambia, and Bay Counties

Location	Emissions (tons per year)				
	CO	NO_x	PM	SO_x	VOCs
Okaloosa County	83,402	10,804	6,309	408	41,409
Santa Rosa County	64,325	8,393	8,253	767	38,837
Walton County	49,908	5,892	4,804	259	35,657
Escambia County	97,606	23,979	10,235	37,979	34,619
Bay County	65,306	15,154	5,676	17,964	27,545
Region of Influence	360,547	64,223	35,277	57,376	178,067

Source: USEPA, 2008; CO = carbon monoxide; NO_x = nitrogen oxides; PM = particulate matter; SO_x = sulfur oxides; VOC = volatile organic compound

Greenhouse Gases

The potential effects of GHG emissions from the Proposed Action are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the No Action Alternative and the Proposed Action alternatives have been quantified to the extent feasible in this SEIS for information and comparison purposes.

3.8.3 Analysis Methodology

In the FEIS, a combination of the CAA Prevention of Significant Deterioration (PSD) Rule's 250-ton-per-year threshold for new or modified stationary sources and the General Conformity Rule's regional significance threshold of 10 percent of the region's emissions were used as significance/nonsignificance indicators for air quality impacts. However, recently the USEPA promulgated a revised General Conformity Rule that abolished the regional significance threshold for federal actions in nonattainment or maintenance areas ("Revisions to the General Conformity Regulations," 75 *Federal Register* 17254, April 5, 2010). Given that change, as well as other considerations, a slightly different methodology is being used for this SEIS.

In the SEIS, in order to evaluate air emissions and their impact on the overall ROI, the emissions associated with the project activities were compared with the total emissions on a pollutant-by-pollutant basis for the ROI's 2008 National Emissions Inventory data. Potential impacts to air quality are evaluated with respect to the extent, context, and intensity of the impact in relation to relevant regulations, guidelines, and scientific documentation. The CEQ defines significance in terms of context and intensity in 40 CFR 1508.27. This requires that the significance of the action must be analyzed in respect to the setting of the Proposed Action and based relative to the severity of the impact. The CEQ National Environmental Policy Act (NEPA) Regulations (40 CFR 1508.27(b)) provide 10 key factors to consider in determining an impact's intensity.

It should be noted that to provide for a more conservative analysis, the counties were selected as the ROI instead of the USEPA-designated Air Quality Control Region, which is a much larger area.

Calculated air emissions were compared with the annual total emissions of the appropriate counties (Okaloosa, Santa Rosa, Walton, Escambia, and Bay Counties) as represented in the 2008 National Emissions Inventory to identify impacts. The air quality analysis focused on emissions associated with construction activities, increased flight operations, munitions use, tactical vehicles, and increases in personnel at the installation.

Chemical releases to the environment are presented in the Hazardous Materials sections of this SEIS. These sections discuss emissions other than the air emission criteria pollutants of carbon monoxide (CO), nitrogen oxides (NO_x), particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}), sulfur oxides (SO_x), and volatile organic compounds (VOCs).

3.8.4 Laws and Regulations

In accordance with EO 12088, *Federal Compliance with Pollution Control Standards*, DoD facilities must ensure that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to the CAA and other environmental laws. In support of EO 12088, AFPD 32-70, *Environmental Quality*, requires Air Force facilities to comply with applicable federal, state, and local environmental laws and standards. Furthermore, AFI 32-7040, *Air Quality Compliance*, establishes a framework for Air Force facilities to follow in order to comply with applicable CAA requirements. Within this framework are the requirements to obtain and maintain operating permits as required and to prepare and periodically update a comprehensive base emissions inventory.

In 1996, Eglin AFB determined that emission thresholds needed to qualify as a "major" source under the federal Title V Operating Program promulgated in 40 CFR 70, were exceeded for various criteria pollutants and hazardous air pollutants (HAPs). In general, a major source is defined as any stationary facility or source of air pollutants that directly emits, or has the potential to emit, 100 tons per year (tpy) or more of any criteria air pollutant (with the exception of HAPs), or has the potential to emit (considering emission controls) 10 tpy or more of any USEPA-listed HAP, or 25 tpy or more of any combination of HAPs. Eglin AFB was classified as a major source for the pollutants based on its potential to emit.

As a result of this determination, Eglin AFB submitted a Title V permit application to the FDEP during June 1996. The FDEP issued a final Title V permit dated July 2, 1999. Eglin has continued to operate under a Title V permit, including several revisions and renewals since that initial permit was issued. The current permit 0910031-013 AV was issued in May 2009. The majority of emissions associated with the Proposed Action are related to construction and mobile sources, such as aircraft and highway vehicles, and are not covered under the Title V Operating Program.

The USEPA has recently promulgated several final regulations involving GHGs either under the authority of the CAA, or as directed by Congress, but none of them apply directly to the Proposed Action. Under the CAA, USEPA has recently promulgated an endangerment finding involving motor vehicle tailpipe emissions of GHGs ("Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act," 74 *Federal Register* 66496, December 15, 2009); a regulation to control light duty automobile exhaust emissions of GHGs ("Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards," 75 *Federal Register* 25324, May 7, 2010); and a tailoring rule establishing PSD thresholds for major stationary sources of GHGs ("Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule," 75 *Federal Register* 31514, June 3, 2010). In addition, as directed by Congress, USEPA promulgated a final GHG reporting rule ("Mandatory Reporting of Greenhouse Gases," 74 *Federal Register* 56260, October 30, 2009).

In its final endangerment finding, USEPA determined that GHGs threaten the public health and welfare of the American people and that GHG emissions from on-road vehicles contribute to that threat. In the light-duty vehicle rule precipitated by the endangerment finding, USEPA and the Department of Transportation's National Highway Traffic Safety Administration finalized a joint rule to establish a national program consisting of new standards that apply to the manufacturers of model year 2012 through 2016 light-duty vehicles that will reduce GHG emissions and improve fuel economy. As a result of the light-duty vehicle rule, USEPA believed that the tailoring rule for PSD and Title V permitting was necessary.

The tailoring rule is necessary because with promulgation of the GHG rule for light-duty vehicles, PSD and Title V applicability requirements are triggered for stationary sources of GHG emissions as of January 2, 2011. The rule establishes two initial phase-in steps. Step 1 began on January 2, 2011, and covered only sources and modifications that would otherwise undergo PSD or Title V permitting based on emissions of non-GHG pollutants. No additional PSD permitting actions or Title V permitting will be necessary solely due to GHG emissions during this period. However, a Best Available Control Technology review of the GHG emissions may be required if the PSD permit process is under way for non-GHG emissions and the net increase in GHG emissions exceeds 75,000 tpy CO_2-e. Sources with Title V permits must address GHG requirements when they apply for, renew, or revise their permits. Step 2 began on July 1, 2011, and covers new large sources of GHG emissions that have the potential to emit 100,000 tpy CO_2-e or more (provided that they also emit GHGs or some other regulated New Source Review pollutant above the 100/250 tpy (mass based) statutory thresholds), and modifications at existing sources that increase net GHG emissions by 75,000 tpy CO_2-e or more, (provided that it also results in an increase of GHG emissions on a mass basis). GHG emission sources that equal or exceed the 100,000 tpy CO_2-e threshold will be required to obtain a Title V permit if they do not already have one.

Under the mandatory reporting rule, fossil fuel and industrial GHG suppliers, motor vehicle and engine manufacturers, as well as facilities that emit 25,000 metric tons or more of CO_2-e per year, will be required to report GHG emissions data to USEPA annually. The first annual reports cover calendar year (CY) 2010 and were to have been submitted to USEPA in early 2011. Affected facilities were required to have a monitoring plan in place by April 1, 2009. Eglin AFB has prepared a *Greenhouse Gas Monitoring Plan* (U.S. Air Force, 2010a), which was published April 1, 2010, and a *Greenhouse Gas Baseline Inventory Report*, which was finalized in May 2010 (U.S. Air Force, 2010b).

On February 18, 2010, the CEQ released its *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*, which suggests that proposed actions that would be reasonably anticipated to emit 25,000 metric tons or more of CO_2-e GHG emissions should be evaluated by quantitative and qualitative assessments. This is not a threshold of significance but a minimum level that would require consideration in NEPA documentation. The purpose of quantitative analysis of CO_2-e GHG emissions in this SEIS is for its potential usefulness in making reasoned choices among alternatives.

3.8.5 No Action Alternative Consequences

The No Action Alternative includes air emissions from several sources. Criteria pollutant emissions associated with the No Action Alternative are generally related to fossil fuel combustion. The following sources were evaluated:

- Construction emissions
- Incoming JSF personnel emissions
- Air operations
- Munitions use

Specific details regarding the assumptions and calculations associated with the emissions estimates are located in Appendix D, *Air Quality*.

Construction and Personnel Emissions

The No Action Alternative involves the construction of up to 29 new facilities/buildings and open area facilities, or approximately 3,744,081 square feet (ft^2) of new space. Additionally, the No Action Alternative would include the demolition of approximately 198,949 ft^2. Renovation activities are not considered in this analysis as this usually occurs inside buildings and thus emissions affecting the regional air quality are not generated. Table 3-25 summarizes the estimated construction emissions over the life of the project.

Table 3-25. Estimated Construction Air Emissions Under the No Action Alternative

Source Category		Emissions (tons per year)					
		CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Maximum Annual Construction Project Emissions	Acres Paved	0	0	0	0	0	0
	Demolition	0	0	0	1.04	0	0
	Grading Equipment	0	0	0	1.24	0	0
	Grading Operations	0	0	0	443.11	0	0
	Mobile Equipment	1,118.21	7.12	16.97	0.27	2.1	1.55
	Nonresidential Architectural Coatings	0	0	0	0	0	0.2
	Stationary Equipment	559.10	48.27	1.25	0.01	0.06	1.81
	Workers Trips	51.88	65.03	3.23	0.11	0	2.98
	Total	**1,729.19**	**120.42**	**21.45**	**445.78**	**2.16**	**6.54**

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; SO_2 = sulfur dioxide; VOC = volatile organic compound

In association with the JSF beddown, Eglin will also gain an estimated 2,039 personnel. With the influx of people, vehicular emissions will also increase. Emissions from base personnel including mobile sources such as commuting and point sources like those from comfort heating in homes are shown in Table 3-26**.**

As indicated in Table 3-26**,** the highest pollutant percentage is for PM_{10}, which is approximately 1.07 percent of ROI's total emissions based on the USEPA 2002 National Emissions Inventory. In calculating emissions, certain assumptions were made regarding various variables associated with construction activities. There are no air quality issues anticipated with the implementation of the No Action Alternative.

Table 3-26. Percentage of Construction and Additional Personnel Emissions Associated With the No Action Alternative Compared With the Region of Influence

Emission Activities	**Emissions (tons per year)**					
	CO_2-e	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**
Construction Emissions	1,729.19	120.42	21.45	445.78	2.16	6.54
Point Source	10,939.34	6.5	3.21	1.18	24.28	3.44
Mobile Source	7,008.25	8.11	3.36	0.25	0.76	0.35
Total	**19,676.78**	**135.03**	**28.02**	**447.21**	**27.2**	**10.33**
ROI Emissions	--	360,547	64,223	35,277	57,376	178,067
Percentage of ROI Emissions	--	*0.04%*	*0.04%*	*1.27%*	*0.05%*	*0.01%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

JSF Operations

The alternatives considered for the range analysis for JSF include locations at Eglin Main, Duke Field, and Choctaw Field. Eglin Main and Duke Field are located in Okaloosa County, and Choctaw Field is located in Santa Rosa County. This section focuses on the emissions generated from aircraft operations and the use of munitions during training operations.

Aircraft Emissions

Air emissions analysis for the No Action Alternative includes 24 conventional takeoff and landing (CTOL), 20 short take-off vertical landing (STOVL), and 15 carrier-based variant (CV) F-35 aircraft. Included in this analysis is the use of F-16 and F/A-18 aircraft that will be used as "Red Air," or aircraft flown as the opposing force to mimic enemy aircraft. The analysis assumed the same number of sorties per year with emissions for both the main runway and the auxiliary field operations. Emissions were calculated for each variant of F-35 and are summarized in Table 3-27. Emissions represented are for aircraft flight; the emissions do not include aircraft maintenance, test cell, or ground support equipment associated with the F-35 aircraft. Table 3-28 summarizes the emissions expected from engine test cells and ground support equipment. Table 3-29 compares the aircraft emissions from the No Action Alternative with the emissions in the ROI. Details regarding aircraft emissions factors can be found in Appendix D, *Air Quality.*

Training operations would occur over a number of airspaces, including airspace units in Georgia, Alabama, Mississippi, and Florida. Air emissions were calculated for flight activities that are expected to occur below 3,000 feet AGL (air mixing height) for each of the airspace units. Due to the short period of time (averaging approximately 15 minutes), aircraft would operate under 3,000 feet AGL and an aircraft would be in one particular area of the airspace. Thus, the emissions in each airspace would be negligible (less than 0.1 ton per year in an entire airspace unit). Assumptions and calculations are included in Appendix D, *Air Quality*.

Table 3-27. Aircraft Emissions by F-35 Configuration for No Action Alternative

Type of A/C	# of A/C	Emissions/Aircraft (tons/year)						Total Emissions (tons/year)					
		CO_2-e	CO	NO_x	PM	SO_2	HC	CO_2-e	CO	NO_x	PM	SO_2	HC
Eglin Main Base - Red Air Aircraft Emissions													
Red Air CTOL F-16	4	448.43	3.06	0.39	0	0.1	0.07	10,762.36	73.35	9.44	0.35	3.12	1.62
Red Air F-18 for CV JSF	4	1,159.14	7.9	1.02	0	0.3	0.17	17,387.10	118.5	15.25	0.57	5.04	2.61
Red Air F-18 for STOVL JSF	4	853.25	5.81	0.75	0	0.3	0.13	17,064.98	116.3	14.97	0.56	4.95	2.56
							Total	45,214.44	308.1	39.65	1.48	13.1	6.78
Eglin Main Base - Training Aircraft													
CTOL Training JSF	24	638.83	2.09	1.67	0.02	0.20	0.05	15,331.88	50.10	40.19	0.41	4.70	1.19
CV Training JSF	15	955.67	2.78	3.40	0.02	0.29	0.06	14,335.05	41.65	51.07	0.37	4.34	0.91
STOVL Training JSF	20	1,589.78	2.06	5.14	0.03	0.46	0.06	31,795.59	41.26	102.85	0.63	9.12	1.11
							Total	61,462.52	133.02	194.10	1.41	18.15	3.22
Eglin Outlying Field - Training Aircraft													
CTOL Training JSF	24	298.20	0.59	1.02	0.01	0.09	0.01	7,156.91	14.11	24.47	0.20	2.19	0.34
CV Training JSF	15	1,332.59	1.31	6.30	0.05	0.40	0.02	19,988.81	19.61	94.44	0.68	6.05	0.37
STOVL Training JSF	20	938.67	1.00	3.79	0.02	0.29	0.03	18,773.31	20.02	75.85	0.41	5.76	0.51
							Total	45,919.03	53.74	194.77	1.28	14.00	1.21

A/C = aircraft; CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; CTOL = conventional take-off and landing; CV = carrier variant; HC = hydrocarbons; JSF = Joint Strike Fighter; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; SO_2 = sulfur dioxide; STOVL = short take-off vertical landing

Table 3-28. No Action Alternative Aircraft Maintenance and Auxiliary Ground Equipment

Source Category	Emissions (tons/year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
A/C Engine Test Cells - Approach	16.31	0.87	0.72	0.22	0.11	0.04
A/C Engine Test Cells - Taxi/Idle-in	374.33	1.17	0.07	0.06	0.02	0.17
A/C Engine Test Cells - Intermediate	140.02	0.29	1.66	0.19	0.13	0.07
A/C Engine Test Cells - Military	199	0.19	4.9	0.31	0.25	0
Auxiliary Ground Equipment[1]	2,008.18	148.76	42.09	3.18	0.55	5.32
Total	**2,737.84**	**151.28**	**49.44**	**3.96**	**1.06**	**5.60**
ROI Emissions	--	*360,547*	*64,223*	*35,277*	*57,376*	*178,067*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

1. Auxiliary ground equipment (AGE) emissions are based on the F-22A. These are the best available data due to the fact that the F-35 AGE equipment is still in the research stage and emissions indices have not been determined.

Table 3-29. Aircraft Emissions Associated With No Action Alternative Compared With the Region of Influence

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Red Air	10,261.58	86.8	36.8	9.88	2.84	29.36
Eglin Main Base	61,462.52	133.02	194.10	1.41	18.15	3.22
Outlying Field	45,919.03	53.74	194.77	1.28	14.00	1.21
Auxiliary Ground Equipment	2,008.18	148.76	42.09	3.18	0.55	5.32
Total	**119,651.31**	**422.31**	**467.75**	**15.75**	**35.54**	**39.11**
ROI Emissions	--	*360,547*	*64,223*	*35,277*	*57,376*	*178,067*
Percentage of County Emissions	--	*0.12%*	*0.73%*	*0.04%*	*0.06%*	*0.02%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Munitions Use

Several types of munitions are expected to be used on the F-35 training operations. Bombing training missions would involve the carry and/or release of live/inert guided bomb unit (GBU)-12 at Test Area (TA) C-52E on the east side and TA B-82 on the west side. F-35 training will also involve strafing runs associated with basic air-to-ground (BAG) and close air support (CAS) training events using live 25-millimeter (mm) ammunition at TAs C-62 and B-75 for east and west side training, respectively.

Bombs

Table 2-3 shows the number of bombs that would be expended at TAs B-82 and C-52E.

Air emission calculations are based on net explosive weight, and the inert munitions have a net explosive weight of zero. Therefore, only the *live* ordnance emissions are summarized in Table 3-30. An increase in the use of these munitions would be noticed in annual air and munitions use reports once training begins at these test areas, since these would be new mission types occurring at these test areas. Emissions released from these bombs are expected to be minimal. The highest percentage increase would be NO_x, which would still be minimal at less than 0.05 percent of ROI emissions.

Table 3-30. No Action Alternative Munitions Emissions

Source	Calculated Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
GBU-12 Live	0.12	14.78	35.28	0	0.34	0
ROI Emissions	--	*360,547*	*64,223*	*35,277*	*57,376*	*178,067*
Percent ROI Emissions	--	*0.00%*	*0.05%*	*0.00%*	*0.00%*	*0.00%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; GBU = guided bomb unit; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Strafing Runs Training

The completion of BAG and CAS training will involve the use of 114,977 25-mm target practice (TP) ammunition annually. It is anticipated that these training events will occur at TAs C-62 and B-75. Therefore, test area emissions were compared with those from the ROI in this analysis.

The introduction of the JSF training operations would increase 25-mm TP expenditures to the range. Live ammunition was evaluated in the event that JSF training would need to utilize live munitions. JSF training would also include the use of flares, which would cause slight increases primarily in particulate matter (PM) and sulfur dioxide (SO_2) emissions. The largest increase is seen in PM and SO_2, 0.10 tpy, which is less than 0.1 percent of the ROI total (Table 3-31).

Table 3-31. Estimated Emissions from 25-mm Ammunition and Flares for No Action Alternative Strafing Run Training

Source	Calculated Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
25-mm Rounds[1]	0.44	0.05	0.01	0.09	0.09	0
Flares[1]	0.01	0	0	0.02	0.02	0
Total	**0.45**	**0.05**	**0.01**	**0.1**	**0.1**	**0**
ROI Emissions	--	*360,547*	*64,223*	*35,277*	*57,376*	*178,067*
Percent of ROI Emissions	--	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; mm = millimeter; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound
1. Emission factor source: AP-42, Chapter 15: Ordnance Detonation.

Summary

Table 3-32 shows the annual emissions from all sources under the No Action Alternative. This total will provide the baseline emissions for analyzing the significance of the impacts to air quality from all subsequent alternatives.

Table 3-32. Summary of No Action Alternative Air Emissions

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Construction and Personnel Emissions	19,676.79	135.03	28.02	447.21	27.2	10.33
Total Aircraft and Ground Support Emissions	119,651.31	422.31	467.75	15.75	35.54	39.11
Total Munitions Emissions	0.57	14.83	35.29	0.1	0.44	0
Total	**139,328.67**	**572.17**	**531.06**	**463.06**	**63.18**	**49.44**
ROI Emissions		*360,547*	*64,223*	*35,277*	*57,376*	*178,067*
Percent of ROI Emissions		*0.16%*	*0.83%*	*1.31%*	*0.11%*	*0.03%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxides; VOC = volatile organic compound

3.9 HEALTH AND SAFETY

3.9.1 Definition

The safety analyses address explosive safety, ground safety, and flight safety issues. Potential health impacts resulting from aircraft noise are discussed in Sections 3.3 and 4.3. Explosive safety relates to the management and use of ordnance or munitions associated with training activities. Ground safety considers issues associated with O&M activities that support range operations, including fire response. Ground safety also includes construction safety issues associated with development of the support facilities, expansion runways, and road improvements. Flight safety considerations include aircraft mishaps and bird/wildlife-aircraft strike hazards (BASHs). The Air Force defines four categories of aircraft mishaps: Classes A, B, and C, and High Accident Potential. Class A mishaps result in loss of life, permanent total disability, a total cost in excess of $1 million, or the destruction of an aircraft. The analysis focuses on Class A mishaps because of their potential to affect private property or the public. BASHs are also addressed, because these constitute a safety concern due to the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur.

3.9.2 Region of Influence

The ROI for safety would be Eglin AFB, Duke Field, Choctaw Field, and test areas used for munitions training activities on the range (TA B-70, TA B-75, TA C-52, TA C-62, and TA C-72), as well as any adjacent off-base areas that potentially would be affected by safety issues related to the Proposed Action. Additional areas underlying training airspace areas discussed in Section 3.4.2 would also potentially be impacted.

3.9.3 Analysis Methodology

In the analyses, issues that have a potential to affect safety are evaluated relative to the degree to which the activity increases or decreases safety risks to military personnel, the public, and property. For example, analyses evaluated whether the potential for an increase in the number of aircraft Class A mishaps from flight operations or bird/wildlife-aircraft strikes were evaluated by comparing the projected operational tempo (i.e., number of proposed aircraft sorties) against aircraft-specific mishap rates or installation historic bird/wildlife-aircraft impact data.

3.9.4 Laws and Regulations

As discussed in detail in the FEIS, a variety of Air Force regulations address and govern safety. These include Air Force Manual (AFMAN) 91-201, *Explosives Safety Standards*, AFI 91-202, *U.S. Air Force Mishap Prevention Program*, Air Force Pamphlet 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques*, and AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Standards*.

Under 29 CFR 1960 series, OSHA standards do not apply to military-unique workplaces, operations, equipment, and systems. However, according to DoD instruction, they apply insofar as is possible, practicable, and consistent with military requirements. AFOSH standards apply unless specifically exempted by variance or determined to be an acceptable deviation.

3.9.5 No Action Alternative Consequences

Construction

Explosives Safety

Explosive safety quantity distance (ESQD) areas are established under AFMAN 91-201, *Explosives Safety Standards*. The ESQDs are separation distances between explosive storage areas such as storage igloos, handling areas such as weapon loading areas, and other areas such as "hot" cargo pads. ESQDs are based on the maximum storage capacity of each facility to prevent explosive propagation from one storage facility to another. Additionally, ESQDs are established to provide a safety zone between the explosive storage areas and the surrounding areas.

The largest ESQD area on Eglin Main Base is located on the north side of the runways away from the developed area. This area surrounds the facilities of the munitions storage area (MSA). A second ESQD zone surrounds the flightline operations zone 800 feet from the arm/disarm pads, hot refueling and aircraft parking apron, and 700 feet from the former alert apron. ESQD zones also surround the hot gun line in the main complex and the munitions loading area at Range 22 (U.S. Air Force, 2001).

The No Action Alternative would include construction and/or renovation of facilities where munitions may be stored. Additionally, other ordnance storage areas may be constructed to support the JSF mission (Table 3-33).

Table 3-33. JSF IJTS – Munitions Storage/Maintenance Facilities

Buildings	Acres
De-arming Facilities	0.12
Munitions Arming Area	2.30
Hot Gun/De-arming Area	4.59
Live Ordnance Loading Area	27.55
Modular Storage Magazine	0.10
Modular Storage Magazine	0.10
Modular Storage Magazine (small)	0.04
Munitions Maintenance Facility	0.23
Munitions Training Facility	0.54

IJTS = Initial Joint Training Site; JSF = Joint Strike Fighter

The proposed munitions storage and maintenance facilities would be located in the northwest portion of Eglin Main Base, at the existing MSA. ESQDs would also be associated with the Live Ordnance Load Area and other storage facilities located adjacent to the runway. All selected munitions storage and maintenance facility locations would meet mission and ESQD requirements; no inhabited buildings or public roadways would be located within the ESQD.

As part of the construction of new munitions storage facilities, Explosive Site Plan (ESP) packages would be submitted in accordance with AFMAN 91-201, *Explosives Safety Standards*. These ESPs would illustrate the relationships and requirements between surrounding exposures and the facilities being sited. No adverse impacts to explosive safety from implementation of the No Action Alternative are anticipated.

Ground Safety

Day-to-day operations, maintenance, and construction activities conducted at Eglin AFB are performed in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by AFOSH requirements. Specific safety requirements and responses to events that may occur on the Eglin Range are detailed in published range operating procedures. All aspects of ground safety at Eglin AFB are within Air Force standards. The safety practices and procedures have been firmly established, and these proven standards will continue to be adhered to. The introduction of the F-35 will enhance certain areas of ground safety; for instance, it is expected that the robotic refueling system for the aircraft will improve ground safety and minimize human interaction during this potentially hazardous task.

Ground O&M activities on Eglin AFB would continue to be conducted using the same processes and procedures as under current operations. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable Air Force safety requirements, approved technical data, and AFOSH standards.

To support the JSF training mission, several facilities would be constructed, while other facilities would be altered or have additional space developed. No unique construction practices or materials are required to construct these facilities. During construction, standard industrial safety standards and best management practices (BMPs) would be followed. These would include: implementing procedures to ensure that guards, housekeeping, and personal protective equipment are in place; establishing programs and procedures for lockout, right-to-know, confined space, hearing conservation, forklift operations, and so on; conducting employee safety orientations and performing regular safety inspections; and developing a plan of action for the correction of any identified hazards. No unusual ground safety risks are expected from these activities.

Flight Operations

Explosives Safety

Ordnance such as GBUs and gun-fired ammunition are proposed to be used as part of JSF flight training. Because the types of ammunition, bombs, and munitions to be used are the same or similar to the types currently used at Eglin AFB, implementation of the JSF flight training would not be expected to prevent or significantly limit the ability of range managers to conduct EOD and range maintenance activities. All ordnance would be handled by trained and qualified personnel in accordance with all explosive safety standards and detailed published technical data.

Aircraft-delivered ordnance (e.g., GBUs) would require generation/implementation of weapon safety footprints to define personnel evacuation areas during training activities. On the aircraft, there are several electromechanical safeguards specifically designed to prevent the accidental, inadvertent, or uncommanded release of ordnance such that the risk can be essentially discounted (Air Combat Command, 1999). Conversely, if ordnance fails to release, becoming “hung,” then EAFBI 11-201, Sections 7.6 through 7.12 and its corresponding Attachments 37 to 39 would be followed. EAFBI 11-201 assigns a hazard category to munitions, ensures trainees and supervisors are briefed on the ordnance and emergency procedures prior to takeoff, and spells out emergency notification and response measures. This is discussed in greater detail in the FEIS, Section 7.8.1.2, and in this SEIS’s Appendix K, *Health and Safety*, and is incorporated by reference.

Pilots will follow the specific procedures applicable to the type of hung ordnance their aircraft is carrying and fly a straight-in approach when possible to avoid populated areas. Fire department, weapons, and EOD teams will “safe” the munitions and determine status. Because Duke Field lacks an available barrier/cable system, EAFBI 11-201, Section 7.8.9, outlines specific procedures if a hung ordnance recovery is required at Duke Field.

Pilots will notify Eglin Mission Control prior to departing the test area, including ordnance category, type and number, and whether it is hung or unexpended. Eglin Mission Control will provide a clear route and will advise Eglin Approach Control and the tower of the situation. Eglin Mission Control will also notify Range Operations Control Center and request personnel for de-arming. The Range Operations Control Center will notify the appropriate Maintenance Operations Center who will inform crash rescue, via the hot line, of the specific type and location of ordnance that was loaded on the aircraft. Crash rescue will respond accordingly.

After receiving permission from the tower to enter the runway, EOD personnel shall respond to inspect and clear the area, and de-arm the munition either in place or after taxiing to an appropriate area, if possible. EOD personnel will take other necessary emergency actions as required. After the ordnance is safe, EOD and de-arm crews will notify the pilot of the action taken to make safe the hung/unexpended ordnance.

Eglin currently maintains these precautionary procedures for all takeoffs and landings with ordnance. Live munitions have been carried and released on Eglin ranges for many years by pilots of all experience levels. EAFBI 11-201, Chapter 9, details the extensive live ordnance procedures that these pilots have employed for takeoffs, landings, and hung weapons. Each sortie with planned ordnance release will include an instructor who will be directly responsible for the safety of the mission. The standard procedure for hung ordnance will be to close the bay doors and return to base. JSF pilots will operate in accordance with established procedures to the extent possible, but because this aircraft is a new platform, safety procedures may be modified to provide the highest level of safety for this aircraft specifically.

Ground Safety

Eglin AFB maintains mutual aid agreements with local fire departments in the surrounding area. Should an F-35 crash occur in one of these areas, community firefighters may attempt to extinguish any resulting fire. Any unique training associated with F-35 crash response would also have to be extended to personnel at local fire departments. Specific procedures are also implemented for minimizing the risk of fire from range operations; therefore, implementation of the JSF flight training would not result in heightened ground safety concerns.

Aircraft Mishaps

The Air Force calculates Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. Combat losses due to enemy action are excluded from these statistics. The Class A mishap rate per 100,000 flying hours can be used to compute a statistical projection of anticipated time between mishaps. Data presented are only statistically predictive, since the actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft.

Since the F-35 is a new aircraft, mishap rates have not been established. Historically, mishap rates for new military aircraft are highest during the initial phase of its operational life and decrease steadily throughout the aircraft's lifetime. In order to avoid skewing the analyses with highly fluctuating data that occur in the very early stages of an aircraft's operational life, it was assumed that the F-35A (CTOL) and F-35C (CV) variants would have a mishap rate equal to that of the F-16. This assumption was based on the fact that these are single-seat, single-engine, air-to-air superiority fighters with an attack role, which would be employed in a similar operational manner. Similarly, the AV-8B Harrier (STOVL) was used to predict mishaps rates for the F-35B, based on performance, structural, and operational similarities of both aircraft. Though the performance of the F-35 cannot be predicted, given the expected improvements in single engine technology and system safety, the F-35 should deliver an even better safety record than previous single engine aircraft. As such, the Air Force would not expect the F-35 destroyed aircraft rates to exceed the initial rates of the F-16.

Table 3-34 presents the statistically predicted time between Class A mishaps for all three of the variants of the JSF flight training conditions. As previously stated, this analysis makes only a statistical prediction regarding the frequency of mishaps and may not represent real-world conditions. Current safety policies and procedures at Eglin are designed to ensure that the potential for aircraft mishaps is reduced to the lowest possible level. These safety policies and procedures would continue with JSF flight training.

Table 3-34. Eglin AFB Projected Frequency of Class A Mishaps Associated With JSF Training

Aircraft	Air Force-wide Mishap Rate	Annual Sorties Proposed Action	Total Flight Time per Year (Hours)[c]	Time Between Mishaps (In Years)
F-16 (F-35 A& C)	3.58[a]	12,064	16,890	1.65
AV-8B (F-35B)	10.03[b]	6,496	9,094	1.10

AFB = Air Force Base

a. U.S. Air Force, 2011b

b. Scott, 2012

c. Computed by multiplying total sorties per airspace segment in baseline year times the time spent in each airspace segment. (Note: An airspace segment is a section of an Air Traffic Service Route, such as a military training route, within which aircraft may be subjected to Air Traffic Control, and which is identified by two electronic navigation aids at the extremities and/or reporting points.)

There is also potential for aircraft mishaps to occur over operational airspace units. The risk remains low, however, since the vast majority of aircraft mishaps take place immediately adjacent to the runway. Data suggest that as much as 75 percent of general aviation incidents take place on or immediately adjacent to the runway (CA

DOT, 2002). Additionally, Air Force safety policies and procedures and proper coordination with Air Traffic Control would also serve to diminish the likelihood of aircraft mishaps in airspace units during flight training operations. Because training in these airspace units represent only a portion of total JSF operations and because most mishaps take place near the runway, the risk of aircraft mishaps in additional airspace units is expected to be very low.

Bird/Wildlife-Aircraft Strike Hazards

Bird populations are monitored and controlled around Eglin AFB, and the base works closely with the U.S. Department of Agriculture to manage the bird habitat and gather data about the local avian population. Eglin AFB also has the ability to remove terrestrial species (deer, coyote, etc.) from the flightline. More information on BASH can be found in this SEIS's Appendix K, *Health & Safety*, and in the FEIS, Sections 3.8 and 7.8.

From 1998 to 2008, a total of 294 reported incidents of bird/wildlife-aircraft strikes occurred around Eglin AFB, with 150 strikes associated with the F-15, F-16, and C-130 aircraft. None of the bird/wildlife -aircraft strikes occurring at Eglin AFB have resulted in a Class A mishap, although some resulted in significant aircraft damage. Under the No Action Alternative, the number of total annual sorties for all aircraft at the base would increase. It would be expected that the number of bird/wildlife strikes per year would similarly increase; however, the overall risk associated with bird/wildlife-aircraft strikes is expected to remain low.

Additionally, the potential exists for BASH incidents to occur in other airspace units. However, approximately 40 percent of BASH incidents from 1995-2011 occurred during ground operations, takeoff/initial climb, or approach/landing. Approximately 12 percent occurred during low-level, air-to-ground, or air delivery operations. Another 31 percent occurred during unknown phase of flight (U.S. Air Force, 2012). It is expected that the increase of operations within these airspace units would lead to an increase in BASH incidents. However, since these flights would represent a small portion of JSF operations, it is unlikely that the overall risk associated with bird/wildlife-aircraft strikes would increase significantly.

3.10 SOLID WASTE

The evaluation for this SEIS was conducted as outlined in Section 3.9 of the FEIS for BRAC activities associated with the JSF and is incorporated by reference. Collection and disposal of municipal solid waste (MSW) at Eglin AFB is handled by contract and administered by the 96th Civil Engineer Group (96 CEG). Arrow Inc. hauls refuse to a transfer station in Fort Walton Beach. The refuse is then transported 50 miles to Spring Hill Landfill, a Class I Landfill in Jackson County, Florida. C&D debris is also collected as part of this contract as well as by other independent contractors. Most is taken to Point Center Landfill, a permitted C&D disposal facility located in Okaloosa County as discussed within Section 3.9 of the FEIS. The affected environment for each alternative is the additional solid waste generated through additional construction, operations or personnel. As such, information presented within the various alternatives identifies those activities or actions which result in the generation of additional solid waste. Resources for all alternatives remain the same as discussed within Section 3.9.2 of the FEIS.

3.10.1 Definition

Solid waste is defined in the Florida Solid Waste Disposal Facility regulations as any sludge (unregulated by the federal CWA or CAA), garbage, rubbish, refuse, special waste, or other discarded material resulting from domestic, industrial, commercial, mining, agricultural, or government activities. Solid waste includes wastes commonly referred to as MSW (such as garbage and refuse) and C&D debris, which consists of discarded materials generally not soluble in water (steel, glass, brick, concrete, asphalt, etc.).

3.10.2 Region of Influence

The ROI for solid waste resources includes Eglin AFB and the surrounding counties where landfill resources are located. Available resources in the immediate vicinity of Eglin AFB include landfills operated in Okaloosa, Walton, and Santa Rosa Counties. The analysis assumed that additional personnel identified within the alternatives would be living throughout the ROI, with the majority expected to reside within Okaloosa County, thereby increasing the county's MSW generation rate.

Solid waste would be generated within the ROI in the form of MSW from the additional personnel that increase population; construction debris from construction, renovation, and demolition activities associated with cantonment and range configuration; and debris from the expenditure of ordnance during range operation. Solid wastes requiring disposal would require landfill capacity within the ROI. The management and disposal of solid waste is regulated at both the state and federal level.

Collection and disposal of MSW at Eglin AFB is handled by contract and administered by the 96 CEG. As stated in the FEIS, a commercial contractor hauls refuse and C&D debris to a transfer station in Fort Walton Beach prior to final disposal at a Class I or II Landfill. Local solid waste is recycled or disposed of in landfills in Okaloosa, Walton, and either Santa Rosa Counties. All landfills in this area are located, operated, and maintained either by the respective county or privately. All landfills are permitted by the FDEP.

Okaloosa County operates a Class I landfill near Baker, Florida. This landfill is used for disposal of MSW generated in the northern part of Okaloosa County, including Crestview. The county also operates a yard trash mulching facility at the Wright Landfill located on out-leased land on Eglin AFB. Three privately owned C&D debris landfills are located within Okaloosa County: Waste Recyclers, Point Center, and Arena Landfills.

Walton County operates and maintains a Class I and III landfill for county residents. The landfill accepts any household or construction materials except hazardous materials. The landfill, located near DeFuniak Springs, was permitted for "high rising" (a process of expanding the landfill upwards) that will extend the life span of the landfill until 2020 (Floyd, 2005). MSW is transported to a state-permitted solid waste transfer facility located on Hwy 83 approximately 3 miles north of DeFuniak Springs. Four privately owned C&D debris landfills are located within Walton County: Coyote East, Coyote West, J&K, and Waste Recyclers.

Santa Rosa County owns and operates two landfills. The Central Landfill is a Class I facility, primarily serving the central portion of the county. A Class III facility is also located at the Central Landfill, making the total size approximately 550 acres. The life expectancy of the Central Landfill was estimated at year 2075 prior to the 2004 and 2005 hurricanes. Four privately owned C&D debris landfills are located within Santa Rosa County: Coyote Navarre, Joiner Fill Dirt Inc., Persimmon Hollow, and Tower Ridge C&D Landfills.

Although individual landfills were evaluated within the FEIS, total quantities of solid waste (including C&D debris) for each county is utilized within this SEIS as this information better represents the available generation rates within the ROI. The information presented in Table 3-35 lists the average annual amounts of MSW, including C&D debris, generated within Okaloosa, Santa Rosa, and Walton Counties from 2006 to 2010. This includes all solid wastes that were generated within the counties that required management through recycling or disposal. The latest published information available from the FDEP is for CY 2010 (FDEP, 2012).

Table 3-35. Solid Waste Collected in Okaloosa, Santa Rosa, and Walton Counties (tons)

Year	Okaloosa County	Santa Rosa County	Walton County
2002	386,740	357,623	103,837
2003	231,352	224,336	142,168
2004	280,881	418,430	90,032
2005	564,264	754,919	272,787
2006	336,020	295,947	139,641
2007	338,481	212,081	136,882
2008	278,014	152,362	130,239

Year	Okaloosa County	Santa Rosa County	Walton County
2009	273,107	137,405	121,383
2010	290,681	168,800	99,351
Average	**331,060**	**302,434**	**137,369**

3.10.3 Analysis Methodology

Municipal Solid Waste Estimation

MSW is made up of household generated trash, refuse, or garbage and includes paper, metal, cardboard, putrid waste (e.g., discarded food scraps), wood, plastics, and yard wastes. The latest available statistics were published by the USEPA in *Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2009* (USEPA, 2010). Based upon this guidance document, the average generation rate for MSW is 4.43 pounds per person per day. This generation rate was used to evaluate solid waste impacts.

Construction/Demolition Debris Estimation

C&D debris includes materials such as construction materials for buildings, concrete and asphalt rubble, and land-clearing debris. Sampling studies documented in *Characterization of Building-Related Construction and Demolition Debris in the United States* (USEPA, 1998) and *Estimating 2003 Building-Related Construction and Debris Materials Amounts* (USEPA, 2003) indicate that the solid waste generation rate during residential construction activities is 4.39 pounds per square foot (lbs/ft^2) of debris and 158 lbs/ft^2 for demolition activities within the United States (USEPA, 2009a). Generation rates associated with renovation of facilities have not been established; therefore, the generation rate associated with demolition activities (158 lbs/ft^2) was used in calculating the mass of debris from renovation activities.

Debris from Land Clearing

Land clearing wastes would consist of soil and woody wastes associated with site preparation prior to construction activities. Although land clearing activities would generate soils and wood debris, it was assumed that none of the soil and debris generated from tree removal and land clearing would require disposal in a C&D or solid waste landfill. Therefore, these materials would not be expected to impact solid waste resources. This was based upon the assumptions that soils generated from grubbing activities would be used as fill during the construction projects and woody wastes would be (1) used by the wood or woodpulp industry, (2) chipped and reused as mulch or compost, or (3) burned in place under an open burning permit.

Metal Debris from Range Operations

The debris from range operations was calculated based upon the type, or types, of ordnance used. The mass of debris was calculated based upon the actual weight and composition of the utilized munitions according to several sources, including the Toxics Release Inventory-Data Delivery System (TRI-DDS) for small caliber munitions (DoD, 2006b) and published information for guided and unguided bombs and large caliber munitions. The mass of casings, guidance units, and bullets was then multiplied by the quantity of ordnance. It was assumed that metallic debris would be recycled and therefore not disposed of in a debris landfill.

Debris from Aircraft Maintenance

Program depot maintenance will not be conducted at Eglin AFB. Maintenance activities that will be conducted will be flight line maintenance only, which is similar to current operations conducted at the installation. Maintenance activities will result in the generation of solid waste and metal debris. Waste generation associated with flight line maintenance is anticipated to have a negligible overall impact to solid waste generation rates at the installation. This is attributed to the recycling of materials where possible (e.g., cardboard, packing materials, scrap metal), which will minimize the quantity of wastes generated that require disposal within the ROI.

3.10.4 Laws and Regulations

The Florida statutes and regulations governing solid waste management include:

- **Florida Solid and Hazardous Waste Management Act (Florida Statutes 29 Chapter 403):** Requires that counties establish and operate solid waste disposal facilities and that each county implement a recycling program to achieve reduction in the levels of solid waste disposed.
- **Florida Resource Recovery and Management Regulations (FAC 67.2)**: Establishes local resource recovery and management programs and regulates the collection, transport, storage, separation, processing, recycling, and disposal of solid wastes.
- **Florida Solid Waste Disposal Facility Regulations (FAC 62-701)**: Establishes regulations for the construction, operation, and closure of solid waste facilities including landfills.

Air Force regulatory requirements for the management of solid waste include AFPD 32-70, *Environmental Quality*, AFI 32-7042, *Waste Management* (and the Eglin AFB Supplement to AFI 32-7042), and AFI 32-7080, *Pollution Prevention Program*.

Additional information and detail on the regulatory requirements is available in the FEIS.

3.10.5 No Action Alternative Consequences

Personnel

The quantity of additional MSW generated from an increase in personnel was calculated using the USEPA generation rates provided in Section 3.10.3.

Approximately 35,170 pounds (about 17.6 tons) of MSW is anticipated to be generated on a daily basis by the new people associated with the JSF IJTS, including military and civilian personnel and family members (an estimated 7,939 people). On an annual basis, the quantity of MSW anticipated to be generated is approximately 6,418 tons. This quantity is based upon a waste generation rate of 4.43 pounds per person per day for 365 days (one year) and assumes that personnel would be living throughout the ROI, with the majority expected to reside within Okaloosa County.

The waste generated from the additional population would result in an annual increase of MSW generated in the tri-county ROI (Okaloosa, Santa Rosa, and Walton Counties). The average annual generation rate (2006–2010) for each county is 284,613 tons (Okaloosa County), 203,140 tons (Santa Rosa County), and 121,644 tons (Walton County). The average generation rate for MSW across the tri-county ROI is approximately 203,123 tpy. The increase in the MSW generation rate by 6,418 tpy is calculated to increase the overall generation rate within the tri-county ROI by 3.2 percent.

Construction

Construction, demolition and renovation activities required for development of the cantonment area and support facilities would result in the generation of additional C&D debris. The estimate of C&D debris for the No Action Alternative was calculated using the USEPA generation rates provided in Chapter 3 of the FEIS (Section 3.9.3, Analysis Methodology – Construction/Demolition Debris Estimation) multiplied by the square footage of structures undergoing construction, demolition, or renovation. These rates are 4.34 lbs/ft^2 for nonresidential construction and 158 lbs/ft^2 for demolition/renovation activities.

A total of 3,744,081 ft^2 of new construction would be required for new facilities/buildings, taxiways, and runways. It should be noted that square footage was not available for a portion of the structures which include petroleum, oil, or lubricant (POL) West Side Tank Headers, POL Fillstands Flightline, POL Bulk Storage Tanks, Satellite Medical Facility, Utilities, and the STOVL Tower (Duke). Because the bulk of these facilities are installed equipment and not buildings, the waste associated with construction is assumed to be negligible. In addition to construction activities, it is estimated that a total of 2,997,287 ft^2 of existing facilities will be demolished or renovated.

As in the FEIS, the generation rate for demolition activities was used to estimate C&D debris generated from renovation activities, providing a conservative estimate of renovation-generated wastes. In addition, debris associated with construction of paved areas or roadways is often reused in other projects, which would result in less material for disposal at a Class III landfill.

Based upon construction activities, a total of 244,911 tons of debris would be generated during construction (8,125 tons) and demolition/renovation (236,786 tons).

Construction is anticipated to have a duration of approximately three years. Although the annual quantities of C&D waste generated in a given year will depend upon ongoing construction activities, this analysis averages the total quantity of C&D waste across each year for an estimated annual generation rate of 81,637 tpy.

The amount of C&D debris generated during construction, renovation, and demolition activities for the No Action Alternative was compared with the average amount of MSW generated within the tri-county ROI to evaluate the increase of waste expected during the construction phase. Percent estimates are based upon the annual quantity of project-generated waste compared with the five-year county average from available information. Utilizing the annual average generation rate of 203,132 tpy of MSW within the tri-county ROI it is anticipated that construction activities will result in an increase of 40 percent to the MSW generation rate within the ROI.

Flight Operations

Maintenance

Flight line maintenance of the F-35 aircraft will result in the generation of debris from replacement parts and components similar to that generated from servicing of other aircraft. Because programmed depot maintenance will not be conducted at Eglin AFB, the impact to the generation rate of solid wastes and debris will be negligible. Solid waste and debris is expected to include items such as packing material and metal debris (e.g., replaced parts and components). It is expected that much of this material will be recycled (e.g., cardboard, scrap metal) and not result in additional wastes requiring disposal. Wastes generated from flight line maintenance will be managed in accordance with established practices utilized at Eglin AFB and are not anticipated to have a measurable result on the overall quantity of solid wastes generated at the facility.

Munitions

The impacts of the No Action Alternative include the solid waste generated by the JSF flight training activities, including debris from training ordnance. Additional munitions that would be used during training operations at the test areas include live/inert GBU-12, 25-mm ammunition, and flares as described in Chapter 2 (Section 2.1.4, Ordnance Use). The additional number of live and inert GBU munitions expended under this No Action Alternative is estimated at 471 units annually. The expenditure of 25-mm ammunition during close support training runs is estimated at an additional 114,977 rounds, and flares expended are 752 units.

As discussed in Chapter 2 (Section 2.1.4), flight training would require the use of an estimated 121 inert GBU-12 and 350 live GBU-12 munitions.

As stated within the FEIS, the weight of the GBU-12 without the explosive component is approximately 602 pounds. Therefore, for the GBU-12 munitions, an annual total of 283,542 pounds (about 142 tons) of debris may be generated based upon an estimated usage of 471 units per year and weight of 602 pounds, which excludes the explosive component that reacts upon impact.

Training activities would also involve the expenditure of live 25-mm ammunition for BAG and CAS training. It is estimated that an additional 114,977 rounds of 25-mm ammunition would be expended annually. This ammunition uses a projectile that weighs from 6.5 to 7.6 ounces. Expended casings would also be generated but are assumed to be one-third of the projectile weight. Based upon these estimates, a total weight of approximately 61,866 pounds, or 31 tons, of projectile and casings would be generated annually from JSF training activities that use 25-mm ammunition. The 25-mm GBU-12 cannon returns spent casings to the magazine. All such debris is subsequently collected during the post-mission servicing of the aircraft, and the debris is not released to the range. Specific weights of flares utilized in training activities were not readily available for evaluation. Due to the size of the flare casings (about 36 mm), flare use is considered to generate an incidental amount of debris to the quantity of debris generated from other ordnance use.

The total quantity of debris generated during range operations from munitions is estimated to be 173 tons. The annual average amount of MSW (including debris) generated within Okaloosa, Santa Rosa, and Walton Counties from 2006–2010 was 609,397 tons. Based on that five-year annual average, the quantity of waste generated during range training operations would result in an increase of approximately 0.03 percent when compared with the annual average MSW generation rate across the tri-county ROI. Therefore, based upon projected training needs, it is not anticipated that training activities would result in the generation of sufficient waste quantities to affect current waste forecasts at Eglin AFB.

Munitions debris generated from training activities would be recovered and/or removed from the ranges for the purpose of storage, reclamation, treatment, and disposal as solid waste. These activities are ongoing at Eglin AFB since range operations are currently being conducted at the installation. The practices of recovery and removal of range debris are necessary for compliance with AFI 13-212, which requires the range to be cleared of munitions debris on a regular basis. It is anticipated that the bulk of the debris generated would be in the form of scrap metal, which would either be reclaimed or remain on the range. It is anticipated that most of the large debris associated with inert or active bombs would be recovered during range clearing operations while the small-sized debris associated with gun-fired ammunition or some types of ordnance (e.g., flares) would be too small to collect and would likely remain on the range.

3.11 HAZARDOUS MATERIALS AND WASTES

3.11.1 Definition

Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); OSHA regulations; and the Emergency Planning and Community Right-to-Know Act (EPCRA). Hazardous materials have been defined in AFI 32-7086 *Hazardous Materials Management*, to include any substance with special characteristics which could harm people, plants, or animals. Hazardous waste is defined in the Resource Conservation and Recovery Act (RCRA) as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes which could or do pose a substantial hazard to human health or the environment. Waste may be classified as hazardous due to its toxicity, reactivity, ignitibility, or corrosivity. In addition, certain types of waste are “listed” or identified as hazardous in 40 CFR 261.

3.11.2 Region of Influence

The ROI for hazardous materials and hazardous waste for the Proposed Action comprises Eglin AFB, including all areas on the installation that store and/or use hazardous materials or generate and/or store hazardous waste. The ROI is not solely limited to specific areas associated with the components of the Proposed Action, because the impact of those actions may affect basewide hazardous waste generation rates and management of hazardous wastes. Eglin AFB is responsible for the management of hazardous materials throughout the installation, including Eglin Main Base and areas associated with Duke and Choctaw Fields.

Hazardous Materials Management

Eglin AFB has implemented a comprehensive Hazardous Material Management Process for the management of hazardous materials on the installation. This process comprises several elements. The first is the Hazardous Material Cell, a single point for hazardous material requests, evaluation, and authorization. The second element is the tracking system that connects the review/authorization and the distribution/collection process, the Hazardous Materials Management System. Third is the customer service-based storage and distribution process. The Hazardous Material Management Process is described in greater detail in the FEIS, Section 3.10.

Eglin has also developed programs to comply with all federal/state hazardous materials reporting requirements. This effort includes submittal to the state and local emergency planning committees and local fire departments of annual Tier II forms, which are updated inventories of hazardous materials (e.g., jet fuel, diesel) or extremely hazardous substances in excess of specific threshold limits.

Hazardous Waste Management

Eglin AFB is classified as a Large Quantity Generator of hazardous waste per federal guidelines 40 CFR 260.10 and 262.34. The installation maintains a USEPA hazardous waste generator identification number (FL8570024366).

Hazardous wastes are generated during O&M activities. Types of waste include combustible solvents from parts washers, inorganic paint chips from lead abatement projects, fuel filters, metal-contaminated spent acids from aircraft corrosion control, painting wastes (e.g., paper with chrome from overspray, thinners), battery acid, fixer, corrosive liquids from boiler operations, toxic sludge from wash racks, aviation fuel from tank cleanouts, and pesticides. Hazardous wastes are initially stored at approximately 155 Initial Accumulation Points at work locations. No more than 55 gallons of hazardous waste or 1 quart of acutely hazardous waste can be accumulated at these points. Once the storage limit is reached, the waste is taken to the central Hazardous Waste Accumulation Site, building 524, where the material may be accumulated for up to 90 days (U.S. Air Force, 2010c). Additional information on the management of accumulation sites can be found in Section 3.10 of the FEIS.

Eglin AFB has implemented a *Hazardous Waste Management Plan*, EAFBI 32-7003 that identifies hazardous waste generation areas and addresses the proper packaging, labeling, storage, and handling of hazardous wastes (including ozone-depleting substances). The plan also addresses record keeping; spill contingency and response requirements; and education and training of appropriate personnel in the hazards, safe handling, and transportation of these materials (U.S. Air Force, 2010c). Procedures and responsibilities for responding to a hazardous waste spill or other incident are also described in the Eglin AFB *Spill Prevention, Control, and Countermeasures (SPCC) Plan* (U.S. Air Force, 2010d). AFI 32-7042 instructs facilities in the proper manner to manage and dispose of polychlorinated biphenyls (PCBs).

Asbestos-Containing Materials Management

Asbestos has been identified in older buildings at Eglin AFB. Asbestos-containing materials (ACM) include insulation, floor tiles, mastic, pipe-wrap, roofing, and other materials, such as transite siding. Eglin maintains a computerized database system for the management of ACM. The system supports activities that include asbestos physical survey data (e.g., building number, survey date, inspector, location/functional space, material type/description, assessment comments); asbestos laboratory analysis data; and asbestos abatement data (e.g., abatement start/completion dates, contractor name, contractor rating, abatement cost, disposal fee, air monitoring costs, total cost). The database system provides Eglin AFB environmental staff with on-demand data for managing ACM.

ACM is managed in accordance with the base's *Asbestos Management Plan* (U.S. Air Force, 2010e) and *Asbestos Operations Plan* (U.S. Air Force, 2006c). These plans specify procedures for removal, encapsulation, enclosure, and repair activities associated with ACM abatement projects and are designed to protect installation personnel and residents from exposure to airborne asbestos fibers. The base manages asbestos in-place where possible; removing it only when there is a threat to human health or the environment or when it is in the way of construction or demolition. Removal and disposal of asbestos is carried out in strict compliance with all applicable federal, state, and local laws, rules, regulations, and standards.

Lead-Based Paint Management

A lead-based paint (LBP) survey conducted at Eglin AFB identified LBP in older buildings. As with ACM, Eglin has implemented a computerized database system for the management of LBP. Any projects that require alteration or demolition of identified or older structures are reviewed by the Civil Engineering and Bio-environmental Office and may trigger the requirement for LBP surveys. Project designs stipulate appropriate abatement and disposal requirements for LBP. Projects that are likely to crush lead-containing coatings to a form that can be inhaled or ingested are managed in accordance with federal, state, and local transportation, treatment, storage, and disposal requirements.

The Eglin AFB *Lead Based Paint Management Plan* provides specific policy and guidance to identify and address LBP hazards and to protect the public from exposure to these hazards (U.S. Air Force, 2010e). The plan also provides guidance on proper management/disposal of material containing LBP.

Environmental Restoration Program Sites Management

The Environmental Restoration Program (ERP) is used by the U.S. Air Force to identify, characterize, clean up, and restore contaminated sites. Table 3-36 lists active ERP sites on Eglin Main Base, where the current Eglin runway configuration is located and construction activities described in the No Action Alternative would occur (Table 2-2). Figure 3-20 shows ERP sites on Eglin Main Base, including closed sites and sites for which land use controls have been identified.

As of April 2009, a total of 119 ERP sites have been identified at Eglin AFB as containing hazardous material resulting from past disposal activities. All 119 of these contaminated sites have remedies in place (U.S. Air Force, 2009b).

In addition, Eglin AFB has identified 32 locations, grouped around eight sites, where there is suspected contamination associated with the past use of ordnance or munitions. These sites, referred to as Military Munitions Response Program areas, are undergoing initial investigations to document the extent of any contamination (Armstrong, 2006). Eglin has implemented an *ERP Management Action Plan* to track activities and progress associated with contaminated sites on the installation (U.S. Air Force, 2003a).

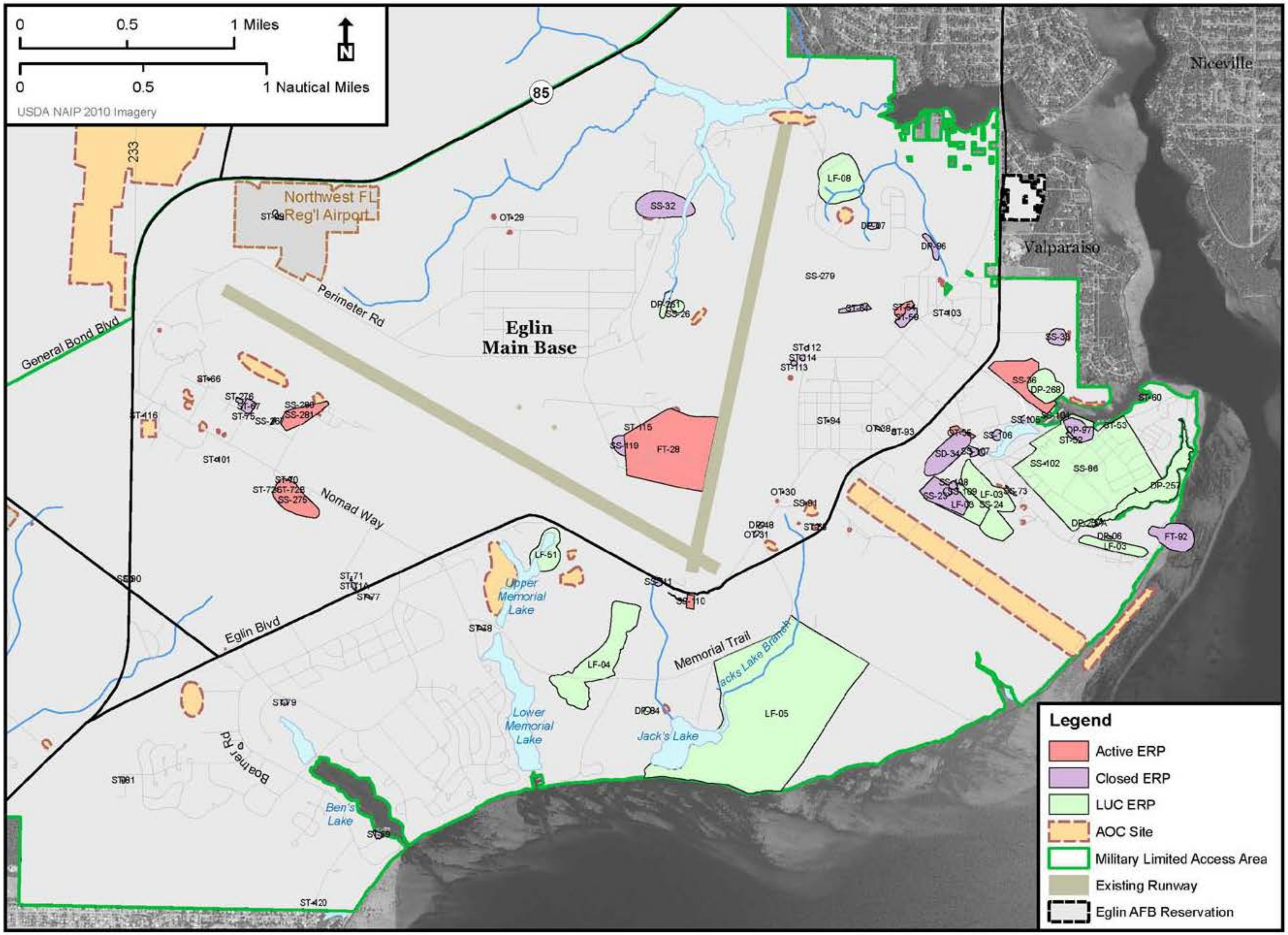


Figure 3-20. ERP Sites Within or Adjacent to Eglin Main Base

Table 3-36. Active ERP Sites Located Within or Adjacent to No Action Alternative

Site	Description	Status
SS-110, Eglin Pipeline Spill Site, Pit 12	This site is part of the abandoned 5-mile jet fuel pipeline that runs along the south side of the flightline on Eglin Main Base. The pipeline was abandoned in 1996 by purging all fuel, flushing with water, capping the ends, and abandoning in place. Petroleum contaminants (BTEX and PAHs) were found in soils and groundwater. Approximately 150 cubic yards of petroleum-contaminated soil was removed in 2000, and an air sparge system was installed in 2001. Subsequent monitoring identified exceedances of NFA criteria in two wells, and MNA was recommended.	Monitoring has indicated that natural attenuation (NA) is not adequately addressing site contaminants. Three additional deep AAS wells were installed to address the contamination.
ST-54, Waste Fuel Storage Tank, Building 989	The site is a former tank field that contained one 5,000-gallon steel UST also used to store JP-4. Petroleum constituents (BTEX and PAHs) were found in soils and groundwater. Both dissolved and free products have been detected in groundwater.	Groundwater samples are collected semiannually. Source area concentrations appear to have been reduced to a point where active remediation is no longer required; however, the current rebound evaluation will be used to determine if this conclusion is correct. The site is expected to reach NFA unrestricted levels.
SS-36, POL Tank Farm	Approximately 4,000 gallons of JP-4 petroleum product were discovered to have been discharged from an underground pipe in 1983. Initial remedial action consisted of trenching and free product removal of 1,900 gallons. Petroleum constituents (BTEX, PAHs, and TRPH) were found in soils and groundwater. Dissolved phase and free product has been detected in groundwater. Between 1986 and 1987, an estimated 5,000 pounds of JP-4 hydrocarbon mass was removed and 150 gallons of free product was recovered. Three air sparge systems are currently operating at the site. A formerly installed bioventing system is currently inactive.	Groundwater samples are collected semiannually. MNA as a means for long-term site management in dealing with residual vadose under the tanks and saturated zone contamination is expected. NFA with controls is the expected exit strategy.
OT-35, Seventh Street BX Station	Approximately 3,600 gallons of petroleum leaked from USTs in 1984. In 1994, soil and groundwater near a UST containing waste oil exhibited petroleum contamination. A pump and treat system (to remove free product), bioventing system, and excavation of contaminated soil, conducted between 1992 and 1997, proved inadequate to remediate the high soil and groundwater contaminant concentrations. Two AAS systems and an SVE system were installed in 2004. These systems have reduced contaminant amounts to cleanup levels, and the groundwater plume has shrunk to the source area.	O&M of the remedial systems and semiannual groundwater monitoring are ongoing.
ST-65, McKinley Climatic Laboratory (Building	This site also includes the Jet Engine Test Cell (formerly Site SD-50). Two USTs were excavated in 1992, and OVA revealed soil excessively contaminated with petroleum constituents soil. Also, the oil/water separator overflowed in 1993, resulting in removal of approximately 120 cubic	Levels in a source area monitoring well remains above NFA criteria, but all site wells are within MNA criteria. The remedy at the site is MNA

Table 3-36. Active ERP Sites Located Within or Adjacent to No Action Alternative, Cont'd

Site	Description	Status
455)	yards of contaminated soil. AAS and SVE systems were operated at the site from 1996 to 2003. Post-remedial action monitoring revealed that rebound occurred, and MNA is currently conducted. Soil excavation has also been completed.	with semiannual groundwater sampling. All soil contamination has been removed from the site. When exposed, the smear zone is being treated by a portable SVE system.
SS-279, JP-8 Spill Site	A JP-8 fuel spill occurred at the site in 2005 during a fuel transfer. Improperly positioned valves caused a 1,000-gallon product recovery tank to overflow, resulting in release of an estimated 1,200 to 1,500 gallons of fuel. The surface soil was saturated with fuels around the UST. Due to the presence of underground utilities and the possibility of undermining a mission-critical fuel facility, minimal soil removal was completed. Soil and groundwater samples taken in 2005 indicated the soil was impacted with BTEX, PAHs, and petroleum hydrocarbons. Two monitoring wells contained free product and were not sampled during the Preliminary Assessment. Groundwater samples were collected from two of the four on-site monitoring wells, and no constituents were detected above GCTLs. Passive bailers removed 4.1 gallons of free product in 2005. A RAP, prepared in 2008, recommended the installation of AAS and SVE systems.	Operation and optimization of the remedial system is ongoing to reduce source area concentrations to a point where active remediation is no longer required. This site is expected to reach NFA unrestricted levels. Groundwater samples are collected quarterly.
SS-275, ACC Tank Farm	This site is associated with Sites ST-70 and SS-72. In 1995, elevated OVA readings were observed, believed to be related to an old AST release. A subsequent search located records of a JP-4 spill. Apparently, the area southwest of Tank 1302 was used to dispose of water in the tank bottom and JP-4 prior to installation of the concrete containment berms around the two ASTs. According to Eglin records, base personnel responded to reports of a JP-4 surface spill in this area in 1985 and recovered approximately 300 gallons of JP-4. Also, subsequent to a 1995 CAR, it was discovered that JP-8 was running out of a drain of a containment unit and that a drain sump was allowing fuel to be released directly to the ground. Base personnel excavated a portion of the containment unit down to 15 to 16 feet, but excessively contaminated soil was still present. The excavation was restored to grade using clean backfill material. A SAR was prepared in 1998 and resulted in discovery of BTEX in soil and groundwater samples. A subsequent RAP identified AAS, SVE, and NA for remediation. Free product was discovered in existing and new monitoring wells, and an investigation concluded that approximately 700,000 pounds of mobile, residual, and dissolved petroleum hydrocarbon contamination exists over an area of approximately 20 acres.	The AAS/SVE systems have been operating since 2006. The system will continue to operate with off-gas treatment to keep emissions below 13.7 pounds per day as required. Selective monitoring wells are sampled quarterly to monitor the progress on dissolved phase and free product abatement.

Table 3-36. Active ERP Sites Located Within or Adjacent to No Action Alternative, Cont'd

Site	Description	Status
SS-280, 33rd Valve Pit to Hot Pit Spill Site	Site SS-280 is located along the pipeline that connects the 33rd Fighter Wing fuel farm to the flightline hot pits. An estimated 1,000 to 30,000 gallons of JP-8 fuel leaked from the pipeline in 2008 or prior. In August 2008, 3,662 tons of contaminated soil was excavated. In 2005, an additional fuel spill occurred, releasing an estimated 1,200 to 1,500 gallons. Surface soil was saturated with fuel around the UST. Minimal soil removal was completed. Soil and groundwater samples collected as part of a 2005 Preliminary Assessment indicated that soils were impacted with BTEX, PAHs, and petroleum hydrocarbons. Two of four monitoring wells contained free product, and passive bailers were installed for removal. A RAP recommended installation of AAS and SVE systems, which were installed in 2008.	The remedial systems are currently in place, and groundwater samples are collected quarterly.
SS-281, 33rd Valve Pit to Hot Pit Spill Site	Site SS-281 is concurrent with SS-280 but represents the deep aspect of the spill.	
FT-28, Eglin Main Base Old Fire Training Area	The site was used as a fire training area from the 1950s until the mid-1980s. Flammable liquids were transferred from an on-site AST or a tank truck into the burn pit through a buried transfer line, and firefighters practiced extinguishing flames on mock aircraft. RFIs in 1994 and 1995 indicated the presence of contaminants of potential concern, including VOCs and petroleum hydrocarbons, in soil and groundwater. Studies in 1998 concluded that NA was reducing BTEX concentrations and that chlorinated VOCs in the deep aquifer were being dechlorinated by microbial action. MNA and long-term monitoring were recommended for groundwater remedy. Also in 1998, a foot of clean soil was spread across the site after all debris was removed, and the site was covered with sod. A bioventing system initiated in 1994 was converted to an SVE system in 2001-2002. An HHRA indicated that risks under current land use are within the USEPA target risk range and only slightly exceed FDEP acceptable risk levels for base workers, maintenance workers, and construction workers under the most conservative RME scenario. Both FDEP and USEPA risk standards are exceeded at the site for future hypothetical residents under both the average and RME scenarios.	O&M of the remedial system and semiannual groundwater monitoring are currently being conducted. Additional monitoring wells were installed in January 2002 and added to the semiannual monitoring plan to delineate the shallow and deep dissolved contamination plumes.

Source: U.S. Air Force, 2009b

AAS = aquifer air sparge; ACC = Air Combat Command; AST = aboveground storage tank; BTEX = benzene, toluene, ethylbenzene, and xylenes; CAR = contamination assessment report; FDEP = Florida Department of Environmental Protection; GCTL = groundwater contaminant threshold level; HHRA = human health risk assessment; ICM = Interim Corrective Measure; JP = jet propellant; MNA = monitored natural attenuation; NA = natural attenuation; NFA = no further action; O&M = operations and maintenance; OVA = organic vapor analyzer; PAH = polycyclic aromatic hydrocarbon; POL = petroleum, oil, or lubricant; RAP = remedial action plan; RME = reasonable maximum exposure; SAR = Site Assessment Report; SVE = soil vapor extraction; TRPH = total recoverable petroleum hydrocarbons; USEPA = U.S. Environmental Protection Agency; UST = underground storage tank; VOC = volatile organic compound

3.11.3 Analysis Methodology

The analyses focused on how and to what degree the alternatives would affect hazardous materials usage and management and hazardous waste generation and management. Potential impacts related to hazardous materials and hazardous wastes were analyzed for the following three effects:

1. Generation of hazardous waste types or quantities that could not be accommodated by the current management system
2. Increased likelihood of an uncontrolled release of hazardous materials that could contaminate soil, surface water, groundwater, or air
3. Adverse impacts to an existing ERP site

Additional details on the analysis methodology as it applies to the three effects listed above can be found in the FEIS, Section 3.10.

Analysis of ordnance used utilizes data from the TRI-DDS database and the annual quantities to determine potential impacts to these ranges. These munitions are not new to these ranges and, therefore, may cause a potential increase in expenditures.

The primary concern related to hazardous materials associated with JSF flight operations is the use of munitions on the Eglin Range. As discussed in the FEIS, Section 7.10, the EPCRA TRI program requires federal facilities to report annual releases and off-site transfers of residue associated with munitions training activities (Table 3-37).

Table 3-37. TRI-DDS Surrogates Used in the Analysis

Item	TRI-DDS Surrogate Item Description*	DODIC	NSN
JSF Operations			
25-mm (TP)	CTG 25MM TP-T M793*	A976	1305013560189
Flares (MJU-8/27)	FLARE, IR CM, MJU-7/B*	L429	1370010385111
GBU-12 (inert)	BOMB PRAC MK82 LD INERT*	F243	–
GBU-12 (live)	BOMB GP 500LB MK82 MOD1*	E482	1325007106769
GBU-31 (inert)	BOMB PRAC MK84, CONICAL FIN, CXU-3A/B SIGNAL CTG	Eb9	-
GBU-38 (inert)	BOMB BLU-109/B (surrogate)	F140	-

CTG = cartridge; DODIC = Department of Defense Identification Code; GBU = guided bomb unit; ILLUM = Illuminating; IR CM = Infrared Countermeasure; JSF = Joint Strike Fighter; LB = pounds; MJU = munitions countermeasures unit; MK = mark; MM = millimeters; NSN = National Stock Number; PRAC = practice; TP = target practice; TP-T = target practice-tracer; TRI-DDS = Toxics Release Inventory-Data Delivery System
* Surrogate used in the analyses

3.11.4 Laws and Regulations

Hazardous wastes must meet either a hazardous characteristic of ignitability, corrosivity, toxicity, or reactivity under 40 CFR 261 or be listed as a waste under 40 CFR 261.

Asbestos is regulated by the USEPA with the authority promulgated under OSHA, 29 USC 669 et seq. Emissions of asbestos fibers to ambient air are regulated under Section 112 of the CAA.

Lead contamination is regulated by the Toxic Substances Control Act, Titles I and IV, and OSHA. In addition, the Lead-Based Paint Poisoning Prevention Act (42 USC 4821 et seq.), as amended by the Residential Lead-Based Paint Hazard Reduction Act of 1992 (Public Law 102-550, also known as Title X), requires that LBP hazards in some federal structures be identified and eliminated.

The Air Force ERP provides for internal standards and procedures for dealing with past contaminated areas. The Defense ERP (DERP) is the statutory authority that establishes a DoD environmental restoration program, which includes the Air Force ERP. Remediation at installations and sites on the National Priorities List is conducted under DERP using CERCLA requirements, with the Air Force as the lead agency. Remediation at other installations and sites may be conducted under CERCLA, RCRA, or other federal and state requirements.

3.11.5 No Action Alternative Consequences

The establishment of the JSF IJTS cantonment on Eglin Main Base was analyzed extensively in the FEIS, Section 6.10.1.2, *Environmental Consequences (Hazardous Materials and Hazardous Waste – JSF IJTS Alternative 1)*.

Construction

Hazardous Materials

The construction of new buildings would be completed using normal construction methods, limiting the use, to the extent possible, of hazardous materials. Typical hazardous materials associated with new construction or renovation are petroleum products, paints, solvents, etc. Eglin AFB currently uses these types of materials and has procedures in place to handle the storage, use, disposal, and all documentation associated with hazardous material use. Therefore, these materials would be stored in proper containers, employing secondary containment as necessary to prevent or limit accidental spills. All spills and accidental discharges of petroleum products, hazardous materials, or hazardous waste would be reported.

All hazardous materials locations have emergency response procedures and site-specific contingency plans established by Eglin AFB. In the case of a hazardous spill or other incidents, the EAFBI 32-7003, *Hazardous Waste Management* (U.S. Air Force, 2010c), and the Eglin AFB *SPCC Plan* (U.S. Air Force, 2010d) specify the response procedures and responsibilities. Any significant change in quantity of hazardous materials used or stored on the installation resulting from the implementation of the No Action Alternative would be documented and reported to state and local emergency planning committees/local fire departments in the annual Tier II forms, as required.

The DoD Pollution Prevention Strategy implemented an aggressive program to reduce or eliminate pollution. The JSF development program incorporates contractual requirements for hazardous materials control and pollution prevention. Policies and procedures currently in place at Eglin AFB will be sufficient to address any issues related to hazardous materials associated with the JSF under the No Action Alternative. No adverse impacts related to hazardous materials are anticipated from the No Action Alternative.

Hazardous Waste

Eglin is currently classified as a Large Quantity Generator of hazardous waste. Eglin personnel indicate that because of Eglin's hazardous waste management capabilities, anticipated increases in waste generation would pose no adverse impacts on the waste management system (Birdsong, 2006). To manage these new waste streams, Eglin AFB would establish new Initial Accumulation Points at generation locations, and personnel managing these locations would be properly trained in waste management. Implementation of pollution prevention and waste minimization measures would further reduce any anticipated impacts.

During construction of JSF IJTS facilities, use of hazardous substances for fueling and equipment maintenance would create the potential for minor spills and releases. Compliance with Air Force best construction practices would reduce this potential to insignificant levels. In addition, an SPCC plan would be developed and implemented, and appropriate spill response equipment would be located on site.

ACM/LBP

Construction activities associated with the JSF IJTS would not be expected to generate hazardous wastes; however, renovation/demolition of some buildings could result in the production of LBP or asbestos wastes. The management of theses wastes would be performed according to prescribed procedures already in place.

Proper disposal of lead-containing wastes would also be conducted in accordance with state and federal regulations, including the Toxic Substances Control Act and the Occupational Safety and Health Act. These wastes would be accompanied by a waste manifest and disposed of at a state-approved facility.

Disposal of asbestos wastes would be conducted under the direction of the National Emissions Standards for Hazardous Air Pollutants (40 CFR 61.40-157). Contracted personnel would have to be trained and certified to remove any asbestos materials. The contractor would submit an asbestos work and disposal plan for any demolition, as well as transport and disposal documentation records, including signed manifests.

There is also a pollution prevention plan, designed to prevent or reduce pollution, reduce safety and health risks, and recycle wastes when possible. Wastes that cannot be recycled are disposed of in a manner approved by the USEPA, at licensed facilities. The implementation of these management requirements would mitigate any adverse impacts resulting from ACM or LBP. As ACM and LBP would not be employed for new construction there would be beneficial impacts associated with the removal of ACM and LBP.

ERP Sites

Ten active ERP sites are located within the proposed footprint for the JSF IJTS and MSA (Table 3-36). Most of these sites are associated with contamination from prior fuels spills. No impacts are anticipated from the presence of these ERP sites. Construction activities near existing ERP sites would be coordinated with Eglin's Environmental Restoration Branch to ensure no adverse impacts to these sites. Regardless, should any unusual odor, soil, or groundwater coloring be encountered during development activities in any areas, the Environmental Restoration Branch would be contacted immediately.

Flight Operations

Potential flight operations impacts from hazardous materials and wastes would occur from maintenance of the F-35 aircraft, munitions use, and any fuel releases during in-flight refueling operations.

Aircraft maintenance wastes would be similar to those already produced at Eglin AFB for F-15 and other aircraft maintenance and would include waste paint or paint-related materials, batteries, sealants, solvents, and miscellaneous halogenated and nonhalogenated solvents. Total quantities of potential wastes generated for routine F-35 maintenance is not currently known. As detailed in the FEIS, an estimated 114 tons of hazardous waste would be generated annually from maintenance activities using known hazardous waste information from F-15 aircraft.

It is expected that some hazardous waste would be generated during F-35 maintenance operations that may require special handling or a dedicated waste removal contractor due to the classified nature of some of the materials generated (Kauffman, 2006). In this case, Eglin would implement appropriate procedures to maintain required security. In the event that any hazardous waste is generated as a result of F-35 maintenance activities that presents any unique hazards over those generated by the F-15 or other aircraft currently at Eglin, the base would implement appropriate hazardous waste control procedures to minimize all potential risks to personnel and the environment.

Munitions fragments and residues would be generated as a result of training missions, and releases to the environment from munitions utilized in training require reporting to the USEPA under the EPCRA TRI program. Eglin AFB has developed procedures to comply with TRI reporting requirements and would track ordnance use associated with the proposed alternatives. Eglin AFB has reported for copper (reporting threshold of 10,000 pounds) and lead (reporting threshold of 100 pounds) in prior years, including 2005. Munitions wastes under the SEIS No Action Alternative are shown in Table 3-38.

Baseline emissions were compared with the quantity of metallic waste (i.e., range residue) generated from munitions training activities at Eglin AFB during 2005. The estimates are based on the number and type of ordnance used in 2005, combined with chemical composition data obtained from the TRI-DDS.

Table 3-38. Munitions-related Wastes – No Action Alternative

Chemicals	Total ROD approved wastes (pounds)[1]	Baseline Munitions Waste (pounds)[2]	Total Munitions Wastes (pounds)	New EPCRA TRI reporting Required
Antimony	9.81	251	261	No
Chromium	80.73	199	280	No
Copper	377.89	103,154	103,532	No
Lead	24.21	14,418	14,442	No
Manganese	1,509.49	1,195	2,704	No
Nickel	16.81	94	111	No

EPCRA = Emergency Planning and Community Right-to-Know Act; ROD = Record of Decision; TRI = Toxics Release Inventory
1. Source: DoD, 2009b
2. Source: U.S. Air Force, 2008a (the FEIS)

The chemical wastes from munitions deployment on the Eglin Range for the No Action Alternative would be less than the amount analyzed in the FEIS. Also, these types of munitions used are the same as those that have historically been used on the range for the 33 FW.

Large metallic residue resulting from aircraft delivery of live/inert/practice ordnance or other ordnance would be removed from test areas on a scheduled basis. In most cases, debris associated with gun-fired ammunition or some types of ordnance (e.g., flares) would be too small to collect and would likely remain on the range. In accordance with AFI 13-212, Class A range procedures, as implemented by Eglin AFB, the range is cleared of munitions debris on a regular basis (U.S. Air Force, 2008b).

Because the proposed JSF training activities are similar to activities already being conducted by other units at Eglin AFB, range clearance procedures would be conducted in the same manner concurrently. The approved JSF flight training activities would be less than the munitions-related waste reported in the FEIS and would not be expected to limit Eglin AFB's capacity or ability to conduct these procedures. No adverse impacts are associated with munitions-related debris generated as a result of the JSF flight operations.

Fuel Releases

As was previously analyzed in the FEIS, Section 7.10.1.1, fuel release events may occur within JSF flight training airspace during air-to-air refueling or in-flight emergencies in which fuel stores are jettisoned from the aircraft. However, this is not normal Air Force practice and is not done in the base airspace environment. In emergency situations, procedures require that fuel dumping be coordinated with Air Traffic Control and be conducted, to the extent possible, over water or unpopulated land areas at an altitude at least 5,000 feet above the highest obstacle (EAFBI 11-201, January 25, 2010).

Air-to-air refueling operations are typically conducted at higher altitudes ranging from 16,000 to 26,000 feet for receiving aircraft. Fuel dispensing aircraft are of three types (KC-135s, KC-10s, or C-130s) that are fitted with instantaneous, automatic closure devices (poppet valves) to reduce fuel loss during transfers. Estimates of fuel losses during refueling events are on the order of 1 quart during normal transfers and 1 to 2 gallons or less during unplanned, emergency breakaways.

Fuel releases from IFEs may potentially impact air quality and water quality within the ROI. However, the descent of fuel through the atmosphere will cause a significant portion of fuel to evaporate into the air, while the remaining liquidized fuel will be deposited onto the surface of marine waters. Fuel evaporation may compromise air quality temporarily, but should quickly dissipate with atmospheric circulation.

The potential for fuel releases from ground refueling or de-fueling prior to maintenance activities would be managed according to the SPCC Plan.

3.12 PHYSICAL RESOURCES

3.12.1 Definition

Soils

Soil is produced by forces of weathering and other soil formation processes acting on parent material. The main processes of soil formation are accumulation of organic matter, leaching of calcium carbonate, reduction of iron, and the reduction of silicate clay minerals. If all of these processes do not occur, the resulting matrix is then referred to as sediment.

Under certain conditions, interaction between stormwater runoff and the soil surface, in association with land disturbances, can create conditions prone to exacerbate erosion.

This may result in adverse effects to land and water resources. In the absence of intervention, the loss of soil through human-induced activity can lead to erosion and permanent loss of soil. Soil erosion is a process of displacement and deposition of surface materials by either wind or water. Erosion can reduce land productivity, pollute waters, and degrade habitats.

Water Resources

Water resources analyzed for each alternative and associated alternative options include surface waters, wetlands, floodplains, coastal zones, and stormwater. Refer to the FEIS, Section 3.11, and the FEIS's Appendix G, *Physical Resources,* for a complete description of each resource, including definitions, laws, regulations, and requirements.

3.12.2 Region of Influence

The affected environment for physical resources includes the soil resource areas and water resources that lie within the boundaries of the proposed cantonment and training areas. These areas would vary among the components of the Proposed Action and alternative options; therefore, the ROI and existing conditions for each alternative are described in this section.

3.12.3 Analysis Methodology

Soils

Soils in the proposed project area were evaluated to identify soil types, define prominent soil properties, and describe relevance to possible soil erosion. Soil types and properties are critical when determining the level of soil erosion that can occur. If activities were to occur in an area where soil loss or erosion is high, the potential effects can damage waterways, cause ground instability, and impact animal and human habitats. Soil attributes were examined to determine soil suitability for the proposed activities.

Soil is defined in terms of permeability, erodibility, composition, and the topography (slope) at proposed project locations. Soil drainage, texture and strength combine to determine erosion, thus determining the suitability of the ground to support structures, and facilities, as well as military activities. The environment for soils that may be affected by proposed changes from training and C&D are evaluated in this SEIS. Attributes examined to determine soil suitability for the proposed activities include natural surface road construction, small commercial buildings, and corrosion of concrete and steel. Additional information on these attributes are provided in FEIS Chapter 3 (Section 3.11). Descriptions of the soils types found at Eglin AFB are provided in Appendix G, *Physical Resources*.

Adverse impacts to soils and associated potential indirect impacts to water resources can be minimized through the implementation of BMPs. The Air Force would be expected to comply with these practices as specified in existing or required permits (discussed in Section 3.12.4).

Water Resources

Determining potential impacts began by identifying and mapping the water resources in and around each alternative area. This allowed for the determination of direct impacts to water resources (construction in floodplains, etc.) for each alternative.

Further analysis focused on stormwater runoff and possible increases in runoff volume and velocity due to land clearing and increases in impervious surfaces over current conditions. To determine stormwater runoff volume and velocity changes, the Natural Resources Conservation Service (NRCS) WinTR-55 computer model was utilized. The FEIS's Section 3.11, and the FEIS's Appendix G, *Physical Resources*, provide a more detailed explanation of the WinTR-55 model. Appendix G, *Physical Resources,* of this SEIS describes how the WinTR-55 model was applied to each alternative.

The USEPA gives guidance on acceptable stormwater runoff volumes and velocities in its *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*. Chapter 4, Section II of that document states, "To the extent practicable, maintain postdevelopment peak runoff rate and average volume at levels that are similar to predevelopment levels" (USEPA, 1993). Using this guidance, impacts were determined by comparing calculated pre- and post-Proposed Action stormwater runoff volumes and velocities obtained from the WinTR-55 model.

3.12.4 Laws and Regulations

Soils

Typically, compliance with the CWA and the NPDES program administered by the USEPA or state environmental quality departments are mandated. Furthermore, a Construction General Permit for surface disturbance of 1 or more acres is required. Compliance with this permit involves developing and implementing a Storm Water Pollution Prevention Plan (SWPPP) and erosion and sediment control plan that includes site-specific mitigation measures. Among other requirements, this SWPPP would:

1. Describe slopes, drainage patterns, areas of soil disturbance, areas where stabilization practices will occur, water locations, and storm discharge locations.
2. Describe erosion and sediment controls, BMPs, and construction site measures (e.g., implementing mitigation measures such as vegetating barren slopes more than 15 percent, and using hay bales and silt fences to reduce surface runoff into local waterways).

3. Outline stabilization and structural plans to permanently stabilize soils and divert water off site and manage stormwater.
4. Provide control for potential pollutants, use approved state and local plans, and prevent non-stormwater discharges.
5. Provide for maintenance and inspection of all designed systems.

Water Resources

Laws and regulations concerning water resources potentially affected by the Proposed Action are summarized below. For additional details please refer to FEIS, Section 3.11.

- Section 303 of the CWA: requires the state to establish water quality standards for waterways, identify those that fail to meet the standards, and take action to clean up these waterways.
- Impaired Waters Rule (FAC 2-303), with amendments: provides the new methodology recently adopted by Florida for assessing the state's waters for 303(d) listing.
- Section 404 of the CWA (30 CFR 330) and Section 10 of the Rivers and Harbors Act (30 CFR 329): provides U.S. Army Corps of Engineers (USACE) with jurisdiction over federal wetlands (33 CFR 328.3).
- Part IV, Florida Statutes Section 373: the state of Florida regulates wetlands under the Wetlands/Environmental Resource Permit program.
- EO 11990, Protection of Wetlands: offers additional protection to wetland resources.
- The FDEP's Chapter 62-312, Dredge and Fill Program: affords regulatory protection to wetland resources (protection from excavating or filling a wetlands area with dirt, rip-rap, and so on) at the state level.
- Section 401 of the CWA: requires federal agencies to obtain certification from the state before issuing permits that would result in increased pollutant loads to a water body, but only if such increased loads would not cause or contribute to exceedances of water quality standards.
- Chapter 62-621, FAC, requires a Generic Permit for Stormwater Discharge from the FDEP for construction activities disturbing 1 or more acres of land.
- Chapter 62-346, FAC: stipulates permits required for the construction, alteration, or maintenance of stormwater management systems in northwest Florida.
- Chapter 40 A-2, FAC: regulates consumptive uses of water and addresses withdrawal guidelines, required permits, water use, and special conditions.

- EO 11988, Floodplain Management: requires federal agencies to avoid adverse impacts associated with the occupancy and modification of floodplains and to avoid floodplain development whenever possible.
- CZMA: provides for the effective, beneficial use, protection, and development of the U.S. coastal zone.
- Energy Independence and Security Act: Requires use of site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.

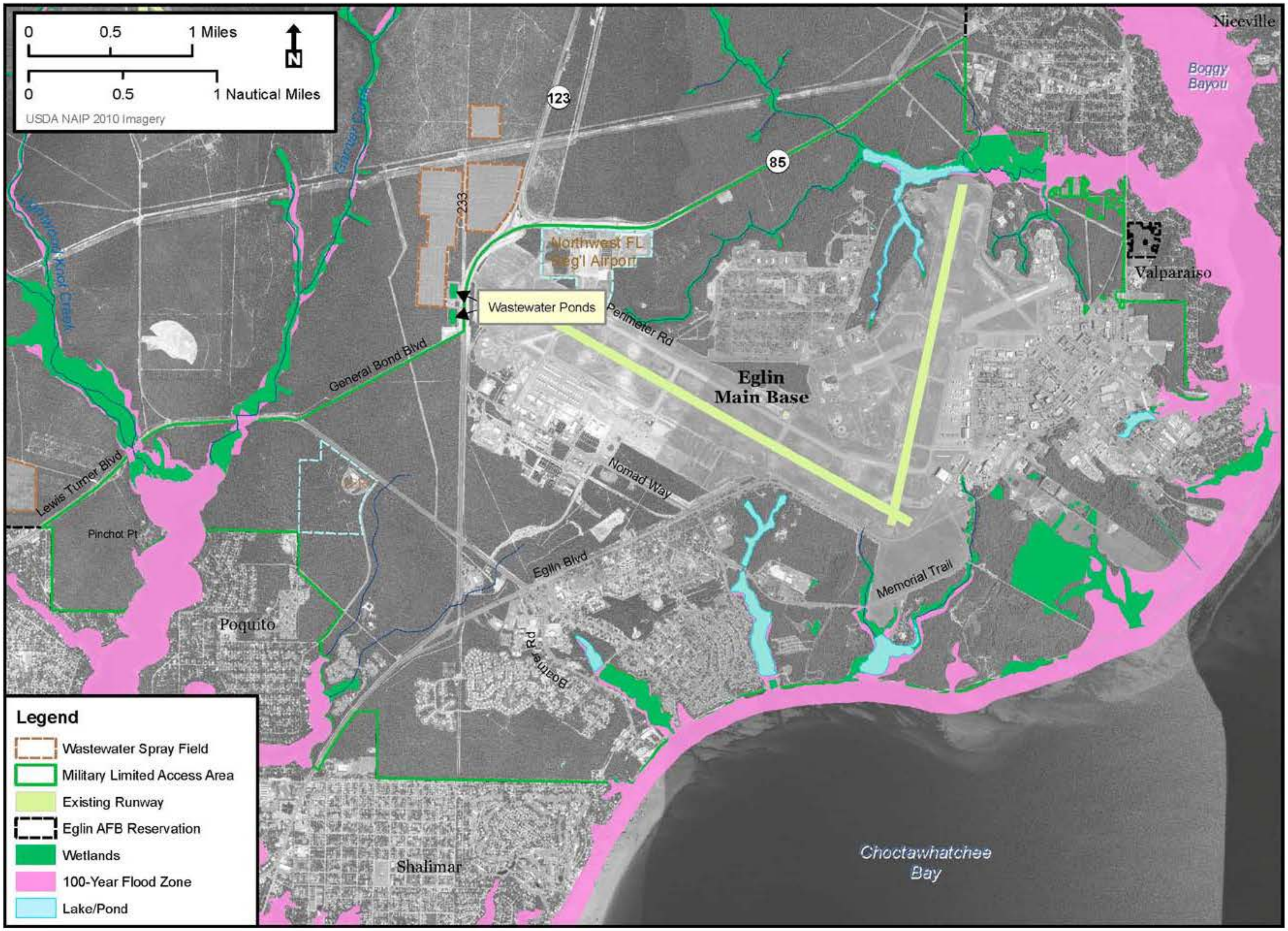
3.12.5 No Action Alternative Consequences

The No Action Alternative would not have an adverse impact on soils. Construction, demolition, and renovation covering approximately 100 acres at the proposed site have little potential to affect soils and create conditions that could result in serious erosion episodes. Most of the area affected under the No Action Alternative is urban land and covered with pavement, cement, or existing buildings (Figure 3-21). The soils within the area that are not currently developed have relatively limited erodibility, and the natural terrain is generally flat. When vegetation is cleared, rainfall events can cause water to move across nonvegetated surfaces and transport soils into local water bodies. Prevention of this transport, through minimizing ground disturbances during construction and vegetation clearance, in addition to providing erosion minimization measures such as BMPs, can help prevent the transport of sediments. Permits that are required, such as NPDES permits, address the effects of ground discharge on maintaining clean water. Utilization of BMPs is one of the primary methods of preventing discharge of sediments into water sources.

BMPs can consist of using one or more of the following measures to slow erosion: (1) hay bales, (2) silt fences, and (3) vegetation buffers. Unless a proposed activity is relocated because of possible heavy impacts to soil erosion, the previously mentioned erosion control practices are best for slowing or halting erosion. Construction sites normally incorporate silt fences and hay bales to slow soil creep into local waterways, creeks, and ponds. Vegetation can help slow eolian (wind-blown) erosion.

Soils and water resources underneath the utilized training airspaces would not experience any adverse impacts. The majority of the land underneath the airspaces is undeveloped with relatively flat terrain. The soils within this area have limited erodibility.

Figure 3-21. Water Resources – No Action Alternative



In accordance with Air Force operating procedures, management activities require that munitions cartridges and debris from blanks, chaff, smokes, simulators, and flares be recovered and disposed of. These cleanup and disposal procedures would substantially reduce the potential for chemical leaching associated with ground releases to pose significant impacts to soil and water quality. With the implementation of these management activities, impacts to soils and water from ground releases are not anticipated.

In addition, the Army has established a similar operating procedure outlined in their Program Management Manual for Military Munitions Response Program, which addresses cleanup of unexploded ordnance (UXO), discarded military munitions, and munitions constituents (USACE, 2009).

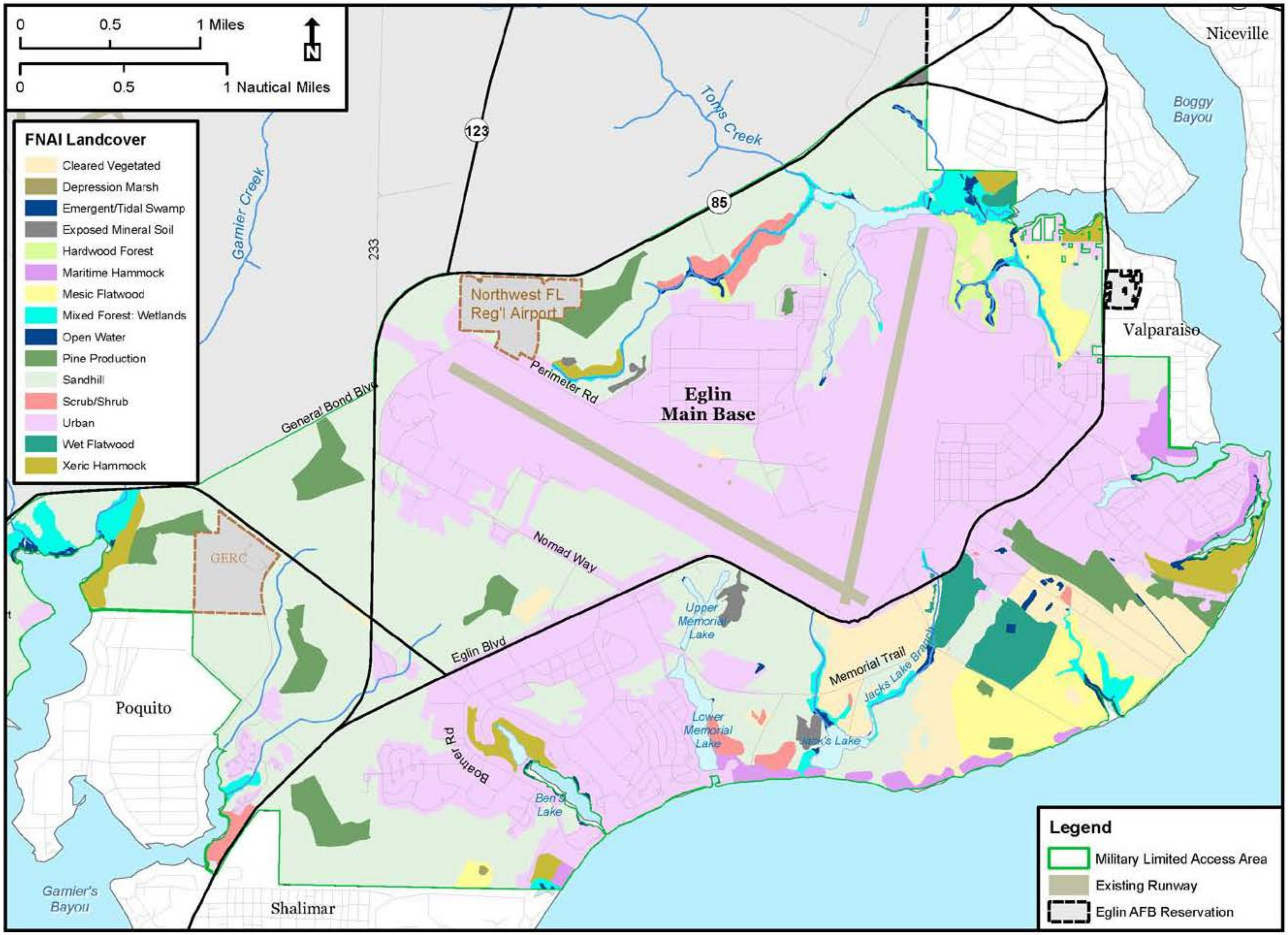
3.13 BIOLOGICAL RESOURCES

3.13.1 Definition

Biological resources include the native and introduced terrestrial and aquatic plants and animals found on and around Eglin AFB. The habitats of Eglin AFB are home to an unusually diverse biological community, including several sensitive species and habitats.

Eglin applies a classification system of ecological associations to all its lands, based on floral, faunal, and geophysical characteristics (Figure 3-22 and Figure 4-76, *Ecological Associations Found on or Near the Alternative 2 Project Areas*). Four broad matrix ecosystems exist on Eglin AFB: Sandhills, Flatwoods, Wetlands/Riparian, and Barrier Island. Artificially maintained open grasslands/shrublands and urban/landscaped areas also exist on Eglin, primarily on test areas and Eglin Main Base. Appendix H, *Biological Resources*, provides descriptions of the ecological associations and artificially maintained areas at Eglin AFB and includes typical flora (plants) and fauna (animals) found within each of these associations.

Figure 3-22. Eglin Main Base – Ecological Associations



Sensitive habitats include areas that the federal government, state government, or the DoD have designated as worthy of special protection due to certain characteristics such as high species diversity, rare plant species, or other unique features. Sensitive habitats found at or adjacent to the Proposed Action (Figure 3-23 and Figure 4-77, *Sensitive Habitats Found on or Near the Alternative 2 Project Areas*) areas and addressed within this SEIS include High Quality Natural Communities, Significant Botanical Sites, and Outstanding Natural Areas. Wetlands and floodplains located within the Proposed Action areas are covered in Section 3.12, *Physical Resources*.

Appendix H, *Biological Resources*, provides details on the sensitive habitats found at the Proposed Action areas.

Sensitive species are those species protected under federal or state law to include migratory birds and threatened and endangered species. An *endangered* species is one that is in danger of extinction throughout all or a significant portion of its range. A *threatened* species is any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Appendix H, *Biological Resources*, provides additional detail on the natural history of sensitive species related to the Proposed Action.

Biological surveys for sensitive species at all potential construction areas were completed in September 2009 (Entrix, 2009). The biological surveys provide a more thorough knowledge of state listed species and are provided in Appendix H, *Biological Resources*.

3.13.2 Region of Influence

Flight Operations

The ROI for flight operations would be the same as was studied in Alternative 1 (FEIS, Section 7.12.1) of the FEIS and incorporated by reference. This ROI includes Eglin Main Base, Duke Field, Choctaw Field, and areas of the Eglin Range that will be used for munitions training on TA C-52, TA C-62, C-72, B-70, and TA B-75. Additional airspace areas discussed in Section 2.3.1.2 would also be utilized for flight operations, although to a lesser extent than the Eglin-owned airspace. Underlying areas were also studied for potential impacts to biological resources.

All alternatives and subalternatives discussed in this SEIS would have the same ROI for flight operations. Munitions training on Eglin Range would be common to all alternatives, as well.

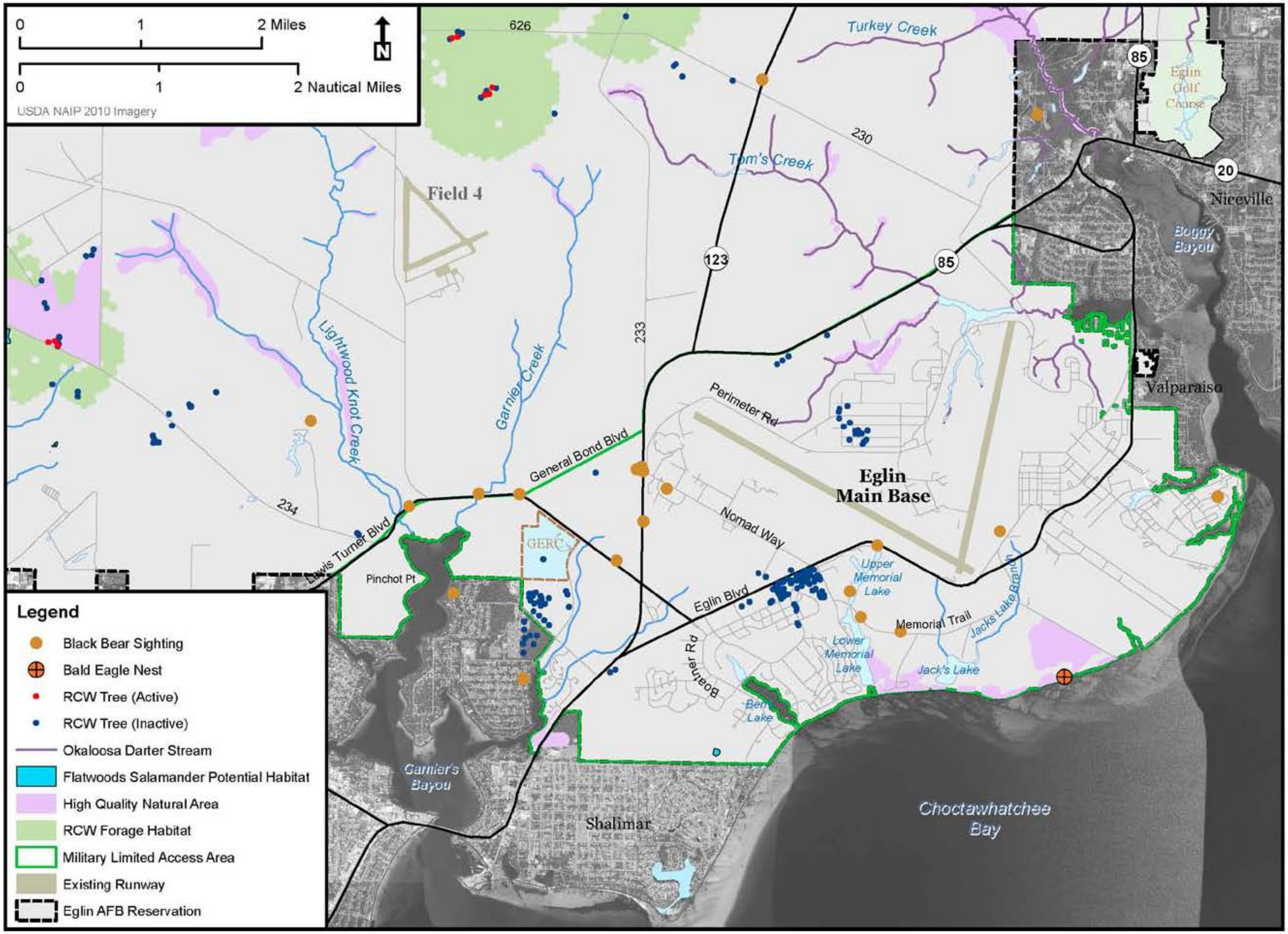


Figure 3-23. Sensitive Habitats and Sensitive Species – Eglin Main Base

3.13.3 Analysis Methodology

The first step in the analysis of potential impacts to biological resources was to determine the locations of sensitive habitats and species in relation to the Proposed Action. Maps were examined to locate sensitive species and habitats, and where necessary, site visits and additional surveys were conducted to confirm locations. Next, areas of overlap for the Proposed Action and sensitive habitats and species were identified. Scientific literature was reviewed for studies that examined similar types of impacts to biological resources. The literature review included a review of basic characteristics and habitat requirements of each sensitive species. Where available, information was also gathered relative to management considerations, incompatible resource management activities, and threats to each sensitive species. Impact analyses were then conducted based on the information gathered from the literature review and discussions with experts in these areas. The analyses included an assessment of the impacts on biological resources resulting from both construction activities and daily operations.

Where appropriate, projected conditions were compared with the baseline, and a determination was made as to whether the impact would be beneficial or adverse. For biological resources, conclusions were drawn regarding the extent of impacts in which the level of anticipated impact is or is not likely to result in jeopardizing the continued existence of the species (U.S. Fish and Wildlife Service [USFWS], 2007). Direct and indirect impacts to the species and its habitat are included in the analysis. The USFWS considers any impact to be significant if potential impacts are anticipated and the action is likely to jeopardize the continued existence of the species.

3.13.4 Laws and Regulations

Laws and regulations applicable to the Proposed Action are summarized below. For additional details please refer to the FEIS, Section 3.12.

- Endangered Species Act (ESA) of 1973 (16 USC 1531 to 1544; 1997–Supp): Provides for the conservation of endangered and threatened species and the ecosystems on which they depend and requires federal agencies to conduct an ESA Section 7 consultation with the USFWS and/or National Marine Fisheries Service if impacts to federally listed species are possible.
- AFPD 32-70: Directs the implementation of the ESA.
- AFI 32-7064: Provides details on how to manage natural resources in such a way as to comply with federal, state, and local laws and regulations and calls for the protection and conservation of state-listed species when not in direct conflict with the military mission.
- Bald Eagle Protection Act (16 USC 668–668d): Prohibits the taking or possession of and commerce in bald eagles.

- Migratory Bird Treaty Act (16 USC 703-712; 1997-Supp) and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*: Protects migratory birds and their habitats and establishes a permitting process for legal taking.
- Marine Mammal Protection Act of 1972: Establishes a comprehensive federal plan to conserve marine mammals.
- EO 13112: States that no federal agency shall authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive nonnative species in the United States or elsewhere.

3.13.5 No Action Alternative Consequences

Air Operations

The primary issue of concern for sensitive species from JSF air operations is noise, especially for bird species. Most commonly, the reaction of birds and wildlife to aircraft noise, particularly when the aircraft is visible to the animal, is some degree of startle response, one response being flushing (i.e., abruptly leaving a nest; Gladwin et al., 1988). In this case, an animal could theoretically leave its nest open to predation, thereby affecting reproductive success (Larkin, 1996).

Impact analyses for listed bird species (Southeastern American kestrel and red-cockaded woodpecker [RCW]), migratory birds, bald eagles, and Florida black bears were conducted in detail in the FEIS, Section 7.12.1.2. As was determined in the FEIS, aircraft are already a major component of the existing noise environment at Eglin; aircraft noise from the No Action Alternative would not pose a novel or new threat to birds and wildlife that would cause adverse reactions, other than temporary flight. While introduction of the F-35 would increase the noise and activity levels at the airfields and along existing flight paths, increases would be gradual, allowing birds to acclimate to the noise. Under the No Action Alternative, the JSF would use existing runways. Wildlife that continue to live near airfields are likely accustomed to the types of noise disturbance produced by missions and are not deterred by the disturbance as long as the habitat is suitable. Even though noise is projected to be louder and cover more area, bears, RCWs, kestrels, eagles, and migratory birds have thrived at Eglin in areas with loud noise environments; suitable habitat appears to have outweighed any negative influences associated with noise.

Likewise, the FEIS analysis concluded that although JSF aircraft would fly over habitat for indigo snake, flatwoods salamander, Florida pine snake, and gopher frog, due to physiological and behavioral factors, the impacts to all four amphibian and reptile species would not be significant. Due to the overall potential for impacts to federally listed species, Eglin's Natural Resources Section (NRS) conducted an ESA Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*).

In the Biological Opinion for the FEIS, the USFWS determined that the BRAC actions are not likely to jeopardize the continued existence of the RCW. A number of required avoidance and minimization measures are specified in the Biological Opinion. Further, these and other mitigations were implemented into the *BRAC 2005 Decisions and Related Actions Final Mitigation and Monitoring Plan for JSF at Eglin AFB* (U.S. Air Force, 2009c).

Domestic animals are not expected to be impacted by increased aircraft noise. According to the *Final United States Marine Corps F-35B West Coast Basing EIS*, "Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time" (U.S. Marine Corps, 2010). Additionally, "Some reviewers have indicated that earlier studies, and claims by farmers linking adverse effects of aircraft noise on livestock, did not necessarily provide clear-cut evidence of cause and effect (Cottereau, 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals" (U.S. Marine Corps, 2010).

Certain protected species may potentially be impacted in or under non-Eglin-owned airspace units in other states. The primary effector would likely be noise or potential for direct collision with bird or bat species or other airborne species. As discussed above, although JSF aircraft would fly over habitat for several listed reptile and amphibian species, due to physiological and behavioral factors, the impacts to amphibian and reptile species would not be significant. There are four federally listed mammalian species that may be impacted by noise from JSF overflights in operational airspace units in Alabama, Mississippi, North Carolina, and Tennessee (Table 3-39 and Table 3-40). These airspace areas are well established, and the current environment is characterized by occasional military aircraft noise. In most of these areas, JSF aircraft would fly at sufficient altitude that the noise at ground level would not likely impact these species. On the low-level routes (VR-1056, VR-1082, and VR-1085), JSF would fly as low as 500 feet AGL, generating an SEL of 129 dB. As mentioned, the typical reaction of birds and wildlife to aircraft noise is some degree of startle response, including flushing from their nest or roost. While introduction of the F-35 would increase the noise and activity levels at the airfields and along existing flight paths, the increases would be gradual, allowing birds and wildlife to acclimate to the noise. Studies suggest that the presence of suitable habitat usually outweighs any impacts from noise.

As discussed in Section 4.9, *Health and Safety*, the likelihood of bird/wildlife aircraft strikes would be small, and the likelihood of a collision with a protected species would be even less. Populations of federally threatened or endangered bird, bat, or butterfly species are not likely to be adversely affected by JSF flight operations in these airspace areas.

Table 3-39. Federally Listed Mammalian Species Present Under Non-Eglin-Owned Airspace Units

State	Species	Scientific name	Federal Status
Alabama	Alabama beach mouse	*Peromyscus polionotus ammobates*	E
	Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*	E
Mississippi	Louisiana black bear	*Ursus americanus luteolus*	T
North Carolina	Carolina northern flying squirrel	*Glaucomys sabrinus coloratus*	E
Tennessee	Carolina northern flying squirrel	*Glaucomys sabrinus coloratus*	E

E = endangered; T = threatened

Table 3-40. Federally Listed Airborne Species Present Under Non-Eglin-Owned Airspace Units

State	Species	Scientific name	Federal Status
Alabama	Wood stork	*Mycteria americana*	E
	Piping plover	*Charadrius melodus*	T
	Gray bat	*Myotis grisescens*	E
	Indiana bat	*Myotis sodalis*	E
	Red-cockaded woodpecker	*Picoides borealis*	E
Georgia	Wood stork	*Mycteria americana*	E
	Gray bat	*Myotis grisescens*	E
	Indiana bat	*Myotis sodalis*	E
	Red-cockaded woodpecker	*Picoides borealis*	E
Mississippi	Indiana bat	*Myotis sodalis*	E
	Mississippi sandhill crane	*Grus canadensis pulla*	E
	Least tern	*Sterna antillarun*	E
	Red-cockaded woodpecker	*Picoides borealis*	E
North Carolina	Indiana bat	*Myotis sodalis*	E
	Virginia big-eared bat	*Corynorhinus townsendii virginianus*	E
	Saint Francis' satyr butterfly	*Neonympha mitchellii fransisci*	E
	Piping plover	*Charadrius melodus*	T
	Roseate tern	*Sterna dougallii dougallii*	E
Tennessee	Gray bat	*Myotis grisescens*	E
	Indiana bat	*Myotis sodalis*	E
	Least tern	*Sterna antillarun*	E

E = endangered; T = threatened

Munitions Use

Strafing at TA B-75 and TA C-62, bombing at TA C-52E and B-82, and flare use at various locations over the Eglin Reservation have the potential to cause direct physical impacts, noise impacts, and habitat impacts to sensitive habitats and species. These impacts were analyzed in greater detail and discussed in the FEIS, Section 7.12.1.2.

Although some increased risk of wildfire would result from munitions use, no direct impacts to sensitive habitats are anticipated from munitions. While fires are usually beneficial in restoring natural communities, it is unknown whether the wildfires potentially associated with the Proposed Action would have a net positive or negative effect on sensitive habitats on and near TA C-62, TA B-75, TA B-82, and TA C-52E. As discussed in the FEIS, (Section 7.12.1.2), restrictions during extreme fire danger would reduce the likelihood of a mission-induced wildfire and its potential negative effects.

A recent change in firefighter safety policy excludes Eglin's NRS personnel from areas where UXO is likely present and fire is on the ground. The risk of UXO in these "no suppression" and "restricted suppression" areas was deemed sufficient to require modified burning and suppression to lower the risk of UXO explosion (Figure 3-24). ("Suppression" is the act of extinguishing fires.) With implementation of these "no suppression" and "restricted suppression" zones, the likelihood for wildfires to persist and potentially impact wildlife has been increased.

Furthermore, the increased munitions use on the ranges mentioned above would likely increase the frequency of wildfires in the no suppression and restricted suppression zones on TA C-62. Likewise, the no and restricted suppression zones at the west side of TA B-75 may also be impacted. TAs C-52E and B-82 include both no suppression and restricted suppression zones. Establishing annual burn areas near TA B-75 and on C-62 would reduce the likelihood that a wildfire would burn unchecked and cause impacts to wildlife. Eglin would continue to operate within the *Wildfire Specific Action Guide Restrictions* (U.S. Air Force, 2006a). Thus, impacts to sensitive habitats from munitions use would not be significant.

No RCW trees are within the impact zones for JSF munitions, however Southeastern American kestrels frequently locate their nests in the abandoned longleaf pine nest cavities of the RCW, and the conditions at the test areas provide ideal perch sites for hunting. There is limited potential for direct physical impacts to active cavity trees at any of the four test areas. Overall, Delaney et al. (2002) found that military training exercises of short duration (less than two hours) conducted near active RCW cavity trees did not significantly affect the ability of the individuals to successfully reproduce. The RCW is nesting successfully in close proximity to TA C-72, TA B-75, and TA B-82 and on TA C-52E, where munitions use already occurs. Similar exposures are likely occurring on occasion throughout these test areas and other test areas on the reservation with no known detrimental impacts on the overall population. Munitions use would follow Eglin's Wildfire Specific Action Guide Restrictions, thus reducing the likelihood of damaging wildfires that have the potential to kill RCW cavity trees. Active and inactive RCW trees exist in the no suppression and restricted suppression zones near TAs B-70 and B-82. Several active and inactive RCW cavity trees occur in the vicinity of TA C-62, but the nearest is more than half a mile away. Active and inactive trees exist in the northern portion of C-52E as well. Overall, impacts to RCWs or the Southeastern American kestrel from JSF munitions use would not be significant.

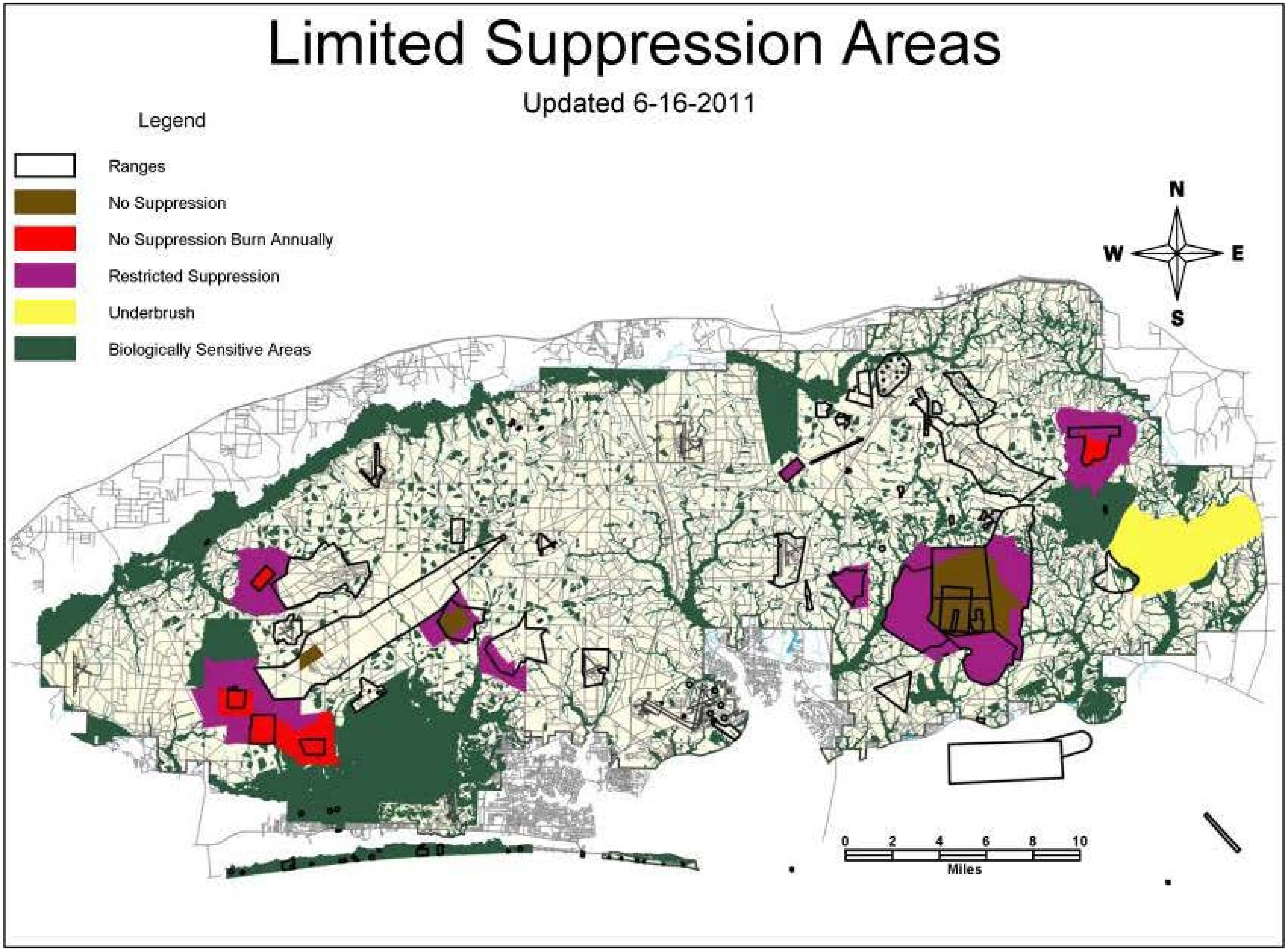


Figure 3-24. Limited Suppression Areas

Gopher tortoises are present on many of Eglin's bombing ranges despite the noise and disturbance. Quality habitat appears to outweigh any negative impacts from bombing. Gopher tortoises also receive protection from noise and physical impact through their use of burrows. Gopher tortoises may spend as much as 80 percent of their time (or about 19 hours per day) in their burrows (Innes, 2009). Therefore, impacts to the gopher tortoise from JSF munitions use would not be significant.

Additionally, Eglin developed the *BRAC 2005 Decisions and Related Actions Final Mitigation and Monitoring Plan for JSF at Eglin AFB, FL* in May 2009 (U.S. Air Force, 2009c). This document addresses in detail mitigations and monitoring actions which will be implemented in order to lessen the impacts of JSF flight training to environmental receptors.

As was detailed in the FEIS, the JSF cantonment area is almost entirely urban/landscaped, and therefore is not considered good wildlife habitat. Animals that use the area near the cantonment are likely habituated to the noise and human presence in the existing developed areas and the adjacent flight line. Daily cantonment operations would not result in an appreciable increase in noise; impacts to wildlife from noise associated with the cantonment area would be minimal.

Previous analyses determined that it is not possible to know whether development of the JSF IJTS would increase bear activity (foraging in garbage, etc.) or decrease it (avoidance of human-related noise, etc.). Due to the poor habitat conditions, and the fact that the area is largely landscaped/urban, it is highly unlikely that daily JSF operations would affect gopher tortoises or indigo snakes. The USFWS concurred with Eglin Natural Resources that any future developments impacting RCW inactive trees on Eglin Main Base are not likely to adversely affect the RCW (USFWS, 1997). It was also concluded that the Okaloosa darter stream north of the MSA (Toms Creek) would not be affected by daily operations at the MSA and that impacts from sedimentation and runoff due to C&D could be minimized by implementing a 100-foot buffer.

Since the area is primarily urban/landscaped and located adjacent to the flight line with little wildlife value or sensitive habitats, overall impacts to biological resources from implementation of the No Action Alternative would not be significant. However, due to the overall potential for impacts to federally listed species, an ESA Section 7 consultation with the USFWS was conducted (FEIS Appendix H, *Biological Resources*).

3.14 CULTURAL RESOURCES

3.14.1 Definition

Cultural resources consist of prehistoric and historic sites, structures, artifacts, and any other physical or traditional evidence of human activity considered relevant to a particular culture or community for scientific, traditional, religious, or other reasons. As defined under 36 CFR 800.16(l)(1), "Historic Property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places [NRHP] maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the [NRHP] criteria."

For an extensive description of this resource, installation history, laws and regulations and methodology use please refer to Appendix F and Section 3.13 of the FEIS. Appendix F, *Cultural Resources,* of this SEIS contains a description of consultations and resources supporting the SEIS.

3.14.2 Region of Influence

For the purpose of this SEIS, cultural resources, with a description of their state of investigation and condition, are presented for analysis as they intersect with the area of potential effect (APE) created by the undertaking. The ROI as defined in this document is equivalent to the APE designation utilized within the National Historic Preservation Act of 1966 (NHPA). As defined under 36 CFR 800.16(d), "the Area of Potential Effect is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking." The APE for this project is assumed not to extend beyond the footprint of the project boundaries as defined under each alternative area.

NHPA obligations (as described herein and in Appendix F) for a federal agency are independent from the NEPA process and must be complied with even when environmental documentation is not required. When both are required, the Air Force coordinates NEPA compliance with their NHPA responsibilities to ensure that historic properties, as defined under 36 CFR 800.16(l)(1) are given adequate consideration. As allowed by AFI 32-7065, Section 3.3.1, and 36 CFR 800.8(a), the Air Force has chosen to incorporate NHPA Section 106 review into the NEPA process, rather than substituting the NEPA process for a separate NHPA Section 106 review of alternatives (AFI 32-7065, Section 3.3.2, and 36 CFR 800.8[c]).

Properties identified in the APE by the Air Force are evaluated according to the NRHP criteria, in consultation with the State Historic Preservation Officer (SHPO) and other parties. Typically, if the SHPO and other parties and the Air Force agree in writing that a historic property is eligible or not eligible for listing on the NRHP, that judgment is sufficient for Section 106 purposes (36 CFR 800.4[c][2]). Procedures and criteria for this can be found in 36 CFR 63, *Determinations of Eligibility for Inclusion in the National*

Register of Historic Places and in Eglin's *Integrated Cultural Resources Management Plan* (Eglin AFB, 2006).

3.14.3 Analysis Methodology

Effects (i.e., impacts) to cultural resources are defined as "alteration to the characteristics of a historic property qualifying it for inclusion in or eligible for the [NRHP]" (36 CFR 800.16(i)). For the purposes of this analysis, impacts are discussed as either adverse or not adverse. An adverse effect "is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR 800 5(a)(1)).

When the Air Force determines either that no historic properties are present or that the undertaking will have no effect on historic properties, it documents the finding and presents it to the SHPO/Tribal Historic Preservation Officer (THPO) for review, as appropriate. If the SHPO/THPO does not object within 30 days of receipt of the Air Force's adequately documented finding, the Section 106 consultation process is complete (36 CFR 800.4(d)). When historic properties are present, the Air Force must assess whether the undertaking will have an adverse effect. If neither the SHPO nor Indian tribes who attach religious and cultural significance to the historic property object to the Air Force's finding, then the undertaking may proceed. If the SHPO or an Indian tribe (e.g., consulting parties: the Miccosukee Tribe of Indians of Florida, the Seminole Tribe of Florida, the Poarch Band of Creek Indians, Alabama, Thlopthlocco Tribal Town, and the Muskogee (Creek) Nation of Oklahoma) objects to the finding within the 30-day review period, then the Air Force must consult with them to resolve the disagreement (36 CFR 800.5(c)). Consultation continues until either the disagreement has been resolved or any party raises the disagreement to the Advisory Council (36 CFR 800.5(c)(2)).

3.14.4 Laws and Regulations

Attention to cultural resources is important to Eglin AFB for its required efforts to comply with a host of federal laws, regulations, and EOs. These laws and regulations are summarized below and discussed in detail in the FEIS, Section 3.13, and the FEIS's Appendix F, *Cultural Resources*.

DoD Instruction 4715.3, *Environmental Conservation Program*, DoD Instruction 4715.16, *Cultural Resources Management,* and AFI 32-7065, *Cultural Resources Management*, outline and specify procedures for Air Force cultural resource management programs. At Eglin AFB, the *Integrated Cultural Resources Management Plan* specifies Eglin-specific policies and procedures regarding the treatment of cultural resources (Eglin AFB, 2006). A brief description of the primary cultural resource compliance law in regard to this Proposed

Action (the NHPA of 1966, as amended) is presented in the FEIS's Appendix F, *Cultural Resources*.

Under NHPA, the Air Force is required to consider the effects of its undertakings on historic properties listed or eligible for listing in the NRHP and to consult with interested parties regarding potential impacts. The NRHP is the nation's formal listing of cultural resources considered worthy of preservation. It is administered by the National Park Service and is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed in the NRHP include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. Refer to Appendix F of the FEIS for a discussion of stages and requirements of Section 106 compliance and to Appendix F, *Cultural Resources*, of this SEIS for a complete discussion of the status of consultation and Section 106 compliance for the 2005 BRAC Report decision.

An amended project-specific programmatic agreement provided in Appendix F, *Cultural Resources,* of this SEIS relates to this need for an alternate way to meet essential compliance under NHPA Section 106 prior to issuing this SEIS's ROD. The amended agreement includes the alternatives from the SEIS that were not considered in the FEIS.

Eglin AFB has established government-to-government relationships with five federally recognized tribes. In regard to this project, all five tribes—the Miccosukee Tribe of Indians of Florida, Thlopthlocco Tribal Town, the Seminole Tribe of Florida, the Poarch Band of Creek Indians Alabama, and the Muskogee (Creek) Nation of Oklahoma—were concurring parties. Eglin AFB maintains a good working relationship with these tribes and enters into consultation when projects have the potential to adversely affect significant prehistoric cultural resources. To date, no traditional cultural properties have been identified on Eglin AFB. Additional discussion of traditional cultural properties can be found in the 2008 FEIS's Section 3.13.1 and its Appendix F, *Cultural Resources*.

Guided by Section 800.3 of 36 CFR, the Air Force initially presented all five federally recognized tribes mentioned above and the State of Florida-recognized Muskogee Nation of Florida with official copies of the *Public Scoping Plan for 2005 Base Realignment and Closure (BRAC) Decisions and Related Actions at Eglin AFB* that highlighted the tentative proposed action and alternatives in July 2006. The Air Force also presented all five federally recognized tribes listed above, as well as the State of Florida-recognized Muskogee Nation of Florida, with official copies of the *Public Scoping Plan for the Eglin AFB BRAC SEIS*, which highlighted the tentative proposed action and alternatives in August 2009. In addition, these tribes were invited to comment and act as concurring parties on the 2011 amendment to the 2008 Programmatic Agreement executed for the FEIS/SEIS. The tribes were consulted and given adequate time to respond. When written comments were not received, Eglin AFB followed up with phone calls to verify there were no comments or concerns. These tribes were concurring parties, not signatories to the Programmatic Agreement due to their preference to not sign documents of this nature.

Eglin AFB will continue to provide updates and consult appropriately with all five of the federally recognized tribes throughout the life of this project, especially with regard to specific areas of tribal concern. A record of communications with the tribes are presented in Appendix F, *Cultural Resources*, of this document.

3.14.5 No Action Alternative Consequences

The No Action Alternative involves implementation of the activities put forth in the February 2009 ROD for the FEIS. Under this alternative, NRHP-eligible resources have the potential to be adversely affected, but these adverse effects have been resolved by the project-specific programmatic agreement among Eglin AFB, the JSF Program, the 7SFG(A), and the SHPO, in consultation with THPOs.

The project-specific programmatic agreement was developed to account for all of the necessary and anticipated inventory of historic properties (36 CFR 800.16[l][1]), the assessment of adverse effects, and the resolution of such effects. The agreement set forth key actions to be completed prior to any activities affecting cultural resources, in the cantonment or range areas. Specific details and actions for cultural resources planning and mitigation efforts remaining to be completed are specified in the project-specific programmatic agreement and the FEIS (Appendix F, *Cultural Resources).* With the implementation of that agreement, actions to be taken by the parties in order to meet environmental compliance responsibilities are explicitly planned out to resolve adverse effects to cultural resources. No adverse effects are anticipated from operations within existing Pine Hill MOAs, Camden Ridge MOAs, Desoto MOAs, Moody MOA, and Rose Hill MOA.

4. ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter describes the environmental consequences associated with each of the alternatives for the beddown of the Joint Strike Fighter (JSF) at Eglin Air Force Base (AFB), addressing construction; flight operations at Eglin Main Base, Duke Field, and Choctaw Field; and munitions training on designated test areas. Where specific consequences associated with a particular environmental resource were found to be the same or substantially similar regardless of the alternative, those consequences are presented at the beginning of the environmental resource's analysis section in a "Commonalities" subsection.

As described in Sections 2.3.4 and 2.3.5, certain elements that are consistent across all action Alternatives are discussed below:

JSF Initial Joint Training Site (IJTS) F-35 aircraft would utilize the runways at Naval Air Station (NAS) Pensacola and Tyndall AFB under *all* of the action alternatives.

The number of JSF IJTS F-35 operations at NAS Pensacola would be the same as those described in the *Proposed Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions at Eglin AFB, FL Final Environmental Impact Statement* (the FEIS). The Air Force compared the JSF IJTS F-35 operations projected for NAS Pensacola to the level of F-35 operations published in the *Air Installations Compatible Use Zones (AICUZ) Study for NAS Pensacola and NOLF Saufley* (U.S. Navy, 2010), and the Air Force determined that the F-35 operations planned for NAS Pensacola would be below those already modeled in the NAS Pensacola AICUZ study.

The JSF IJTS F-35 operations now projected for Tyndall AFB would represent an increase in operations over what was identified in the FEIS, as a result of the Gulf Regional Airspace Strategic Initiative (GRASI) recommendations to relocate simulated flameout operations to Tyndall AFB. Environmental consequences associated with JSF IJTS F-35 operations at Tyndall AFB for an affected environmental resource are presented in the resource's analysis section in this chapter under a "Tyndall AFB" subheading. (If a section does not address impacts at Tyndall AFB, then none would be expected to occur for that resource.) Tyndall AFB has recently conducted a detailed environmental analysis that would be applicable to the JSF IJTS F-35 operations in its *F-22 Operational Squadron and T-38A Detachment Beddown at Tyndall Air Force Base, Florida, Environmental Assessment* (the *F-22 EA*) (U.S. Air Force, 2011c), and, where appropriate, that evaluation is incorporated by reference.

The GRASI also recommended utilizing additional non-Eglin airspace to expand training opportunities. Because the special use airspace (SUA) units are the same across all alternatives, the impacts associated with the utilization of the additional SUA units are the same for each respective resource area across all alternatives.

4.2 AIRSPACE

4.2.1 Commonalities Across All Alternatives

JSF flight training operations associated with the action Alternatives would impact air traffic controller workload and would contribute to increased congestion (air and ground delays) for military and civilian aircraft across the region. However, the Alternatives would include the implementation of GRASI recommendations as described in Sections 1.2.6, 2.3.4, and 2.3.5, which would enhance Air Traffic Control flexibility and decision making to relieve some of the burden on air traffic controllers. GRASI recommendations also will help alleviate air and ground delays for military and civilian aircraft across the region. Conclusions in the GRASI strategic plan state that if the final set of recommendations are undertaken and approved by the FAA, it will "ensure a near optimum use of airspace by civilians and the military" (U.S. Air Force, 2011a).

Tyndall AFB

Tyndall AFB was one of the stakeholders involved in the GRASI study. Increases in F-35 operations at Tyndall AFB over what was identified in the FEIS are a result of the GRASI recommendations to relocate simulated flameout operations to Tyndall AFB (described in Section 1.2.6). Simulated flameout approaches have been shifted from Eglin Main Base and Duke Field to Choctaw Field and Tyndall AFB to improve airspace in the North/South corridor.

4.2.2 Mitigations

Several recommendations provided in the GRASI study could help improve overall congestion in the region and aid air traffic controllers in their decision making process. These recommendations, which are not mature for analysis at this time and are presented in this Supplemental Environmental Impact Statement (SEIS) only as long-term management considerations not specific to the F-35 aircraft are as follows:

- **Establishment of standard instrument departures (SIDs) and standard terminal arrival routes (STARs):** This involves establishing, through coordination with other locations, route entry points for east-west aircraft traffic over shoreline airspace for ascent and descent in order to increase efficiency.
- **Locating remote emitters outside of restricted areas:** At this time no decision has been made and no locations have been identified for potentially locating remote emitters outside of restricted airspace.
- **Expanding operating hours to six days per week:** A study is currently being conducted on the feasibility of operating six days a week; however, a decision has not yet been made.
- **Establishing new partnerships for landscape-scale training:** Landscape-scale training involves utilizing non-military airspace and compatible private, local, state, and federal lands for nonhazardous missions. A year-long study to identify requirements and opportunities for increased mission capability and flexibility was started in April 2012.
- **Evaluating North Pensacola Military Operating Area (MOA) reorganization:** Reorganizing the North Pensacola MOA is currently being evaluated by the Navy for feasibility.
- **Creating a new munitions impact area:** At this time no areas have been identified for a potential new munitions impact area. Separate analysis, if required by the National Environmental Policy Act (NEPA), would be conducted upon the decision to create a new munitions impact area.
- **Creating a regional control facility:** There are no plans at this time to implement this recommendation. Separate NEPA analysis, if required, would be conducted upon the decision to construct a regional control facility.

4.3 NOISE

This section discusses noise effects associated with each of the action alternatives compared with the No Action Alternative, as well as potential hearing loss (PHL), non-auditory health impacts in humans, annoyance, and damage to structures. Additional discussion of specific noise effects on other affected resources can be found in Section 4.4 (*Land Use*), Section 4.5 (*Socioeconomics and Environmental Justice*), Section 4.13 (*Biological Resources*), and Section 4.14 (*Cultural Resources*). Noise metric definitions are presented in Section 3.3.1, and Appendix E, *Noise*, presents information on noise metrics and describes methods used to model aircraft and munitions noise levels.

4.3.1 Commonalities Across All Alternatives

Airspace Noise

Airspace noise impacts of all action alternatives are the same as those associated with the No Action Alternative, as discussed in Section 3.3.5.

Construction Noise

Although site-specific areas of construction differ among the alternatives, construction noise impacts would be similar across all alternatives. Construction noise impacts under Alternative 1A would be the same as those discussed under the No Action Alternative in Section 3.3.5.

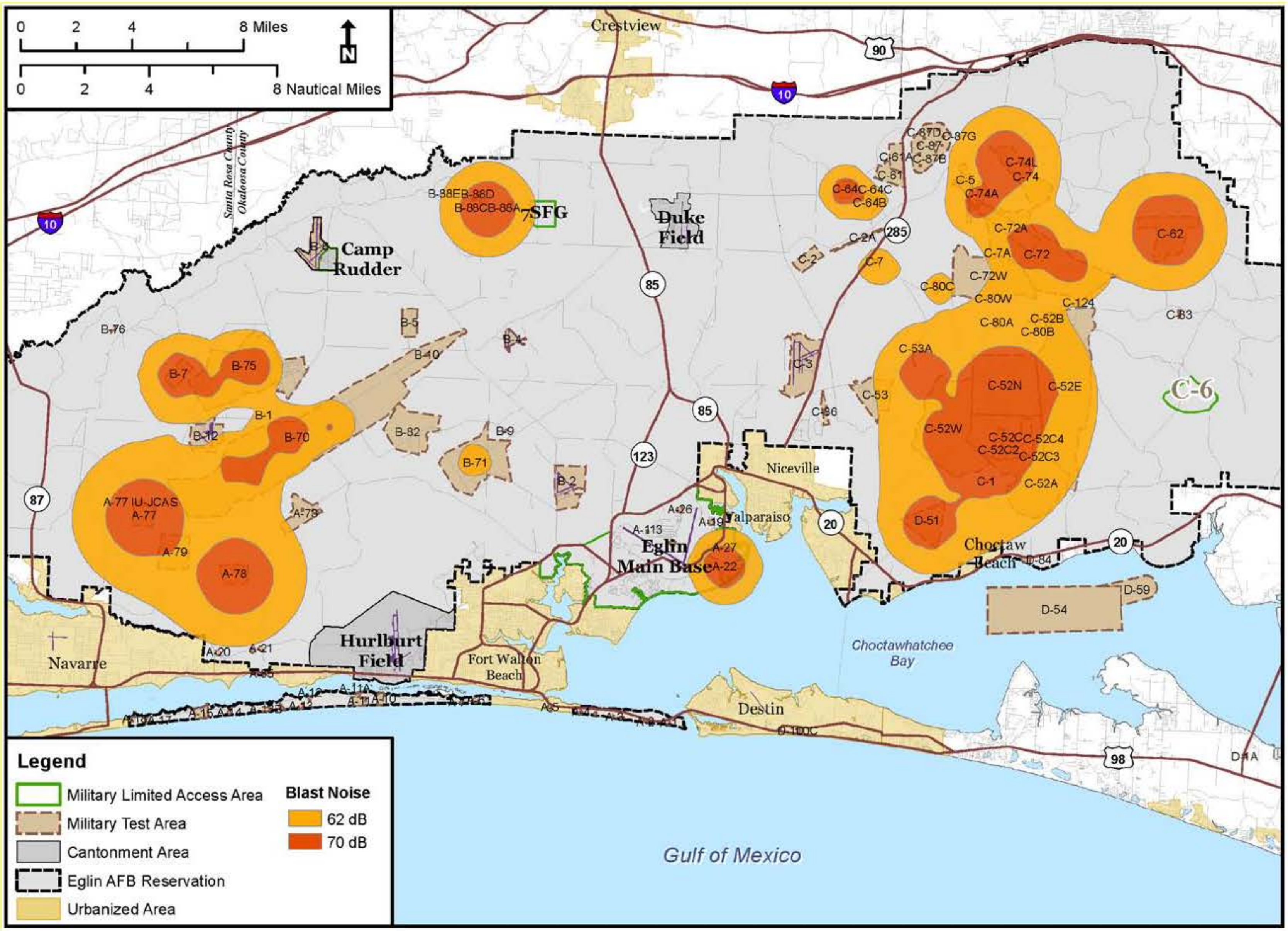
Construction projects conducted under the remainder of the alternatives would not be expected to result in significant noise impacts. Because the scale of the construction projects would be much larger than under Alternative 1A, construction noise would affect a larger area and would last longer. Facilities along haul routes, in particular, would experience an increase in noise due to heavy truck traffic. Construction noise would be temporary, lasting the duration of the projects, and would be expected to be limited to normal working hours (7:00 AM to 5:00 PM). Impacts would be limited to annoyance and would not be significant in nature.

Munitions Noise

The F-35 flight training munitions proposed for use on Eglin Range include the guided bomb unit (GBU)-12 (live), GBU-12 (inert), GBU-31 (inert), GBU-32 (inert), GBU-38 (inert), 25-millimeter (mm) (TP), and munitions countermeasures unit (MJU)-8/27 flares. The annual amount of each type of munitions would be the same under all action alternatives; thus, the munitions noise levels would be the same.

The proposed F-35 high-explosives munitions blast noise would decrease from the No Action Alternative blast noise levels, yielding 35.5 fewer acres off-range impacted at greater than 62 dB C-weighted day-night average sound level (CDNL) as a result of all Eglin AFB munitions use (Figure 4-1). The contours shown in the figure reflect the total munitions noise environment at Eglin AFB, which includes existing munitions use as well as JSF munitions use under the action alternatives (Table 2-4). The 41.8 and 17.7 acres of off-range land that would be impacted by munitions noise at greater than 62 dB CDNL under the action alternatives are in northern Choctaw Beach and Navarre, respectively. No changes to affected acreage in the vicinity of Valparaiso would occur, as JSF munitions use would not occur at Eglin Main Base.

Figure 4-1. High-Explosives Munitions Noise (CDNL) Under All Action Alternatives



Peak noise levels generated during F-35 munitions training would not exceed peak levels currently experienced off-range. F-35 high-explosives munitions training has the potential to cause some additional annoyance in off-range areas as the number of impulsive noise events expected to generate a "medium" risk of noise complaints would increase slightly. The firing of 25-mm cannons was not modeled using a time-averaged noise level. Firing of the 25-mm cannon perpendicular to the listener at a distance of 1 mile would generate a peak noise level that is below the threshold expected to generate a "low" risk of noise complaints.

Tyndall AFB

As described in Section 4.1, the JSF would sometimes utilize the runways at Tyndall AFB for practice approaches. Based on using a conservative operational level, noise modeling indicated that time-averaged noise levels (i.e., the day-night average sound level [DNL]) in the vicinity of Tyndall AFB would not noticeably exceed levels published in the *F-22 EA* (U.S. Air Force, 2011c). Figure 4-2 illustrates noise contours of the most conservative level of F-35 operations from the JSF IJTS plus the level of operations included in the *F-22 EA* (U.S. Air Force, 2011c).

As stated in the *F-22 EA*, the total area exposed to noise exceeding 65 decibels (dB) DNL in the city of Parker, Panama City, and the city of Callaway would increase by 107 acres. The number of acres in unincorporated portions of Bay County exposed to noise exceeding 65 dB DNL would decrease by 190 acres. The number of persons exposed to noise levels greater than 65 dB DNL would increase from 593 to 786. Persons exposed to increased noise levels would be more likely to become annoyed by the noise. The frequency of speech interference at the several representative noise-sensitive locations studied would decrease slightly, except at Parker Elementary School, where the number would increase from two per hour to three per hour with windows closed. The DNL at these noise-sensitive locations would either remain the same or increase 1 to 2 dB DNL relative to baseline conditions depending on the location. The probability of sleep disturbance at residential locations would remain approximately the same as under baseline conditions, with changes ranging from an increase of 1 percent to a decrease of 3 percent under "windows-open" and "windows-closed" scenarios. Existing aircraft noise-related hearing loss concerns in areas on Tyndall AFB would be reduced under either alternative, as fewer structures would be exposed to noise levels at or exceeding 80 dB DNL. As shown in Figure 4-2, there is less than 1 dB difference between the two sets of contours; therefore, no significant impacts would occur as a result of the JSF IJTS F-35 operations. As stated in Section 4.1, the *F-22 EA* (U.S. Air Force, 2011c) is incorporated by reference.

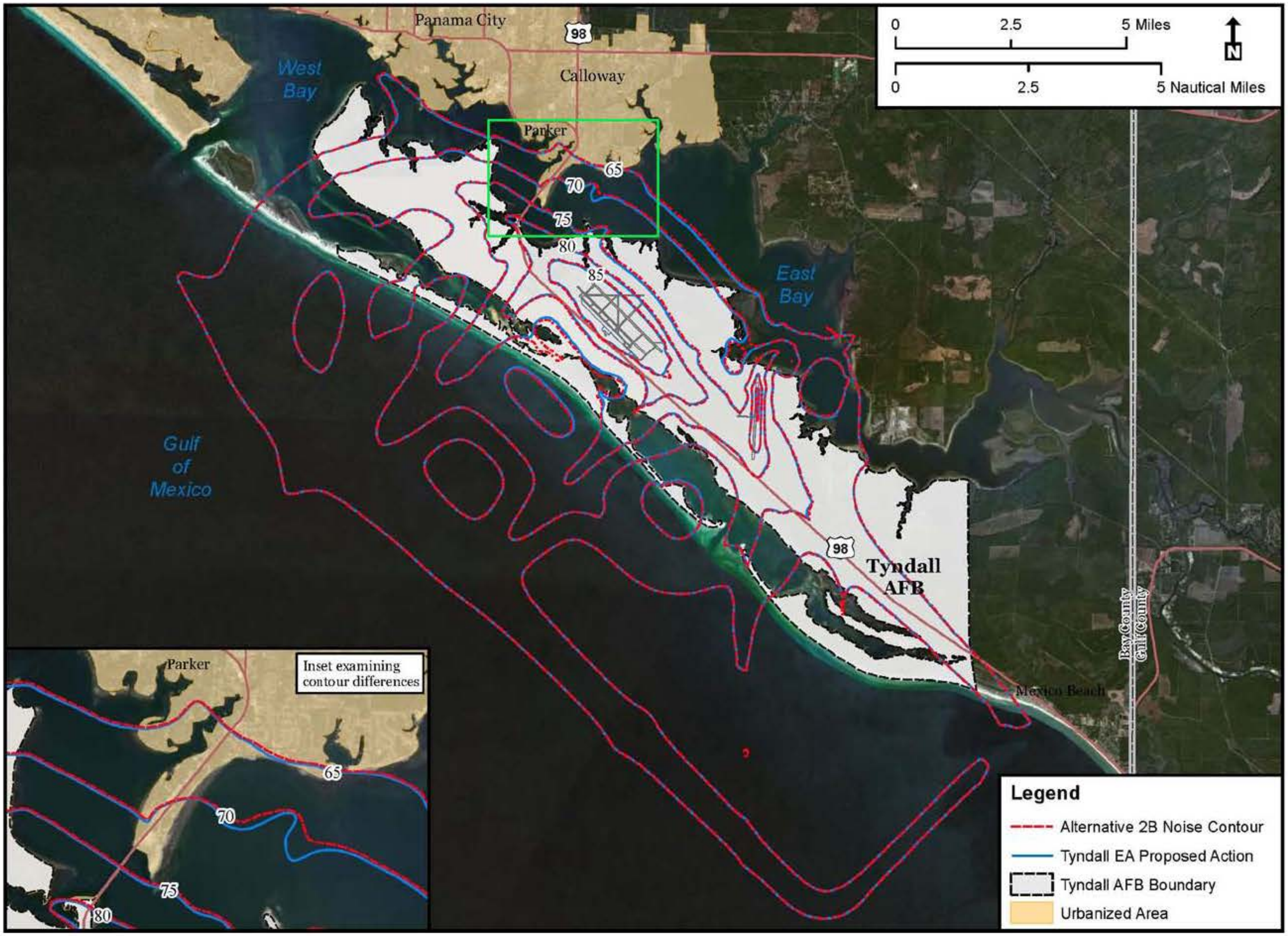


Figure 4-2. Tyndall AFB Noise Contours

4.3.2 Alternative 1 – Eglin Main Base

4.3.2.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Flight Operations

Day-Night Average Sound Level (DNL)

Noise under Alternative 1A was modeled based on training requirements as described in the JSF training plan. In certain departure aircraft configurations (i.e., when a training mission requires the aircraft to depart while heavily loaded), JSF aircraft would be required to use the afterburner to ensure flight safety. These departures would generate more noise than non-afterburner departures. Table 4-1 lists the percent of total departures that are expected to use afterburner power on departure under Alternative 1A.

Table 4-1. Afterburner Departures and "Late Night" Flying Operations (10:00 PM - 7:00 AM) Under Alternative 1A (Preferred Alternative)

Operation	Eglin Main Base		Duke Field		Choctaw Field	
	% Afterburner	% Late Night	% Afterburner	% Late Night	% Afterburner	% Late Night
Departures	17%	0%	0%	1%	0%	1%
Arrivals	n/a	3%	n/a	1%	n/a	1%
Closed Patterns	n/a	0%	n/a	1%	n/a	2%

Note: The numbers listed in the table represent the percentage of total operations at each airfield.

The JSF training plan requires that certain sorties be flown at night, and during summer months, portions of these nighttime training sorties would sometimes occur after 10:00 PM and before 7:00 AM. These "late night" flights would be more likely to disturb sleep and cause annoyance than flights during the day. The frequency of flight operations occurring between 10:00 PM and 7:00 AM under Alternative 1A is quantified in Table 4-1.

Table 4-2 lists the on-base acreage, off-base acreage, estimated off-base population, and residential parcels impacted by various noise levels in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field under Alternative 1A.

Table 4-2. Acreage and Population Affected by Noise Contours Under Alternative 1A (Preferred Alternative) in the Vicinity of Airfields

Noise Level (dB DNL)	Acres OFF-Installation by Airfield EGLIN	DUKE	CHOCTAW	TOTAL Acres OFF-Installation	TOTAL Acres ON-Installation	Population OFF-Installation by Airfield EGLIN	DUKE	CHOCTAW	TOTAL Population OFF-Installation	Total Residential Parcels
65–69	436 ↑63	1 0	1,233 0	1,670 ↑63	10,657 ↑199	1,231 ↑243	1 0	2 0	1,234 ↑243	622 ↑209
70–74	410 ↑173	0 0	836 0	1,246 ↑173	12,104 ↓21	1,033 ↑398	0 0	0 0	1,033 ↑398	356 ↑130
75–79	182 ↑99	0 0	59 0	241 ↑99	4,508 ↓10	549 ↑375	0 0	0 0	549 ↑375	228 ↑175
80–84	45 ↑45	0 0	0 0	45 ↑45	2,500 ↑17	97 ↑97	0 0	0 0	97 ↑97	7 ↑7
>=85	0 0	0 0	0 0	0 0	3,452 ↑49	0 0	0 0	0 0	0 0	0 0
TOTAL	**1,073** ↑380	**1** 0	**2,128** 0	**3,202** ↑380	**33,220** ↑233	**2,910** ↑1,113	**1** 0	**2** 0	**2,913** ↑1,113	**1,213** ↑521

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Note: Acreage estimations do not include areas covered by water. Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

Noise contours under Alternative 1A are depicted in Figure 4-3. Noise levels from F-35 and all other aircraft in the vicinity of Eglin Main Base under Alternative 1A are depicted in Figure 4-4. Noise levels in the vicinity of Eglin Main Base under Alternative 1A *and* the No Action Alternative are depicted in Figure 4-5.

The total number of off-installation acres impacted by noise greater than 65 dB DNL would increase by 380 acres over the No Action Alternative. This would result in an additional 641 off-installation residents being exposed to noise at 65 to 75 dB DNL near Eglin Main Base. An additional 472 off-installation residents near Eglin Main Base would be affected at noise levels greater than 75 dB DNL. At Duke Field and Choctaw Field, the number of acres and persons affected would remain the same as under the No Action Alternative.

The "Schultz curve," as updated by Finegold et al. (1994), defines a generally accepted dose-response relationship between transportation noise and community annoyance. According to this relationship, approximately 12 percent of the people affected by noise at 65 dB DNL may become highly annoyed. At 75 dB DNL, up to 35 percent of the affected population may become highly annoyed, and at 85 dB DNL, approximately 68 percent of people may become highly annoyed by the noise. The National Academy of Sciences 1977 report, *Guidelines for Preparing Environmental Impact Statements on Noise* (Committee on Hearing, Bioacoustics and Biomechanics [CHABA], 1977), states that community response to noise in areas exposed to noise greater than 75 dB DNL can be expected to be "very severe." Community reaction in areas affected by noise levels between 65 and 75 dB DNL would be less severe. Interference of noise with activities that require a quiet environment, such as sleeping, conversing, watching television, and listening to music, often contributes to feelings of annoyance. The relationships between noise and types of activity interference are discussed in Appendix E, *Noise*.

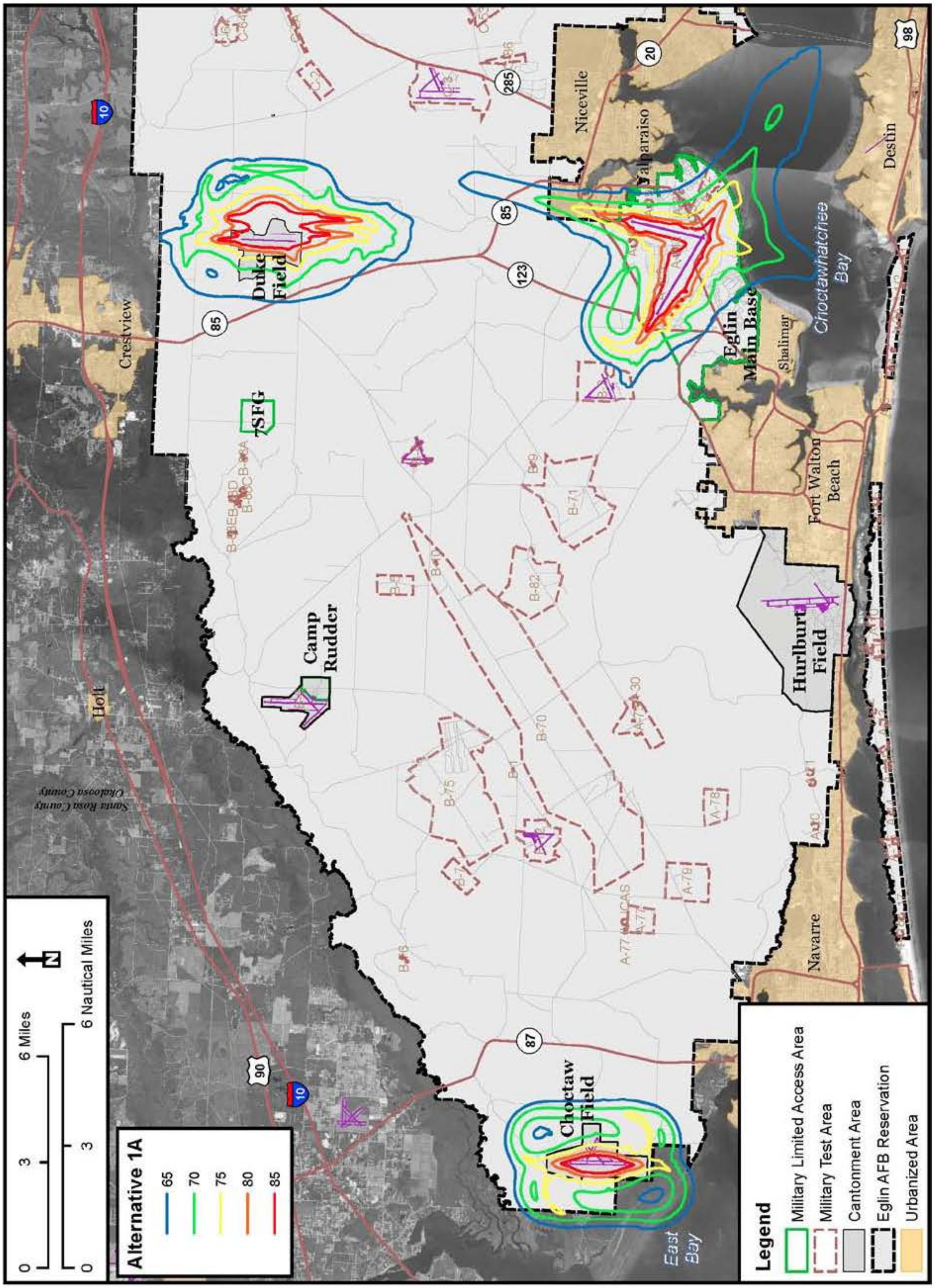


Figure 4-3. Noise Contours from F-35 and All Other Aircraft Under Alternative 1A (Preferred Alternative) in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field

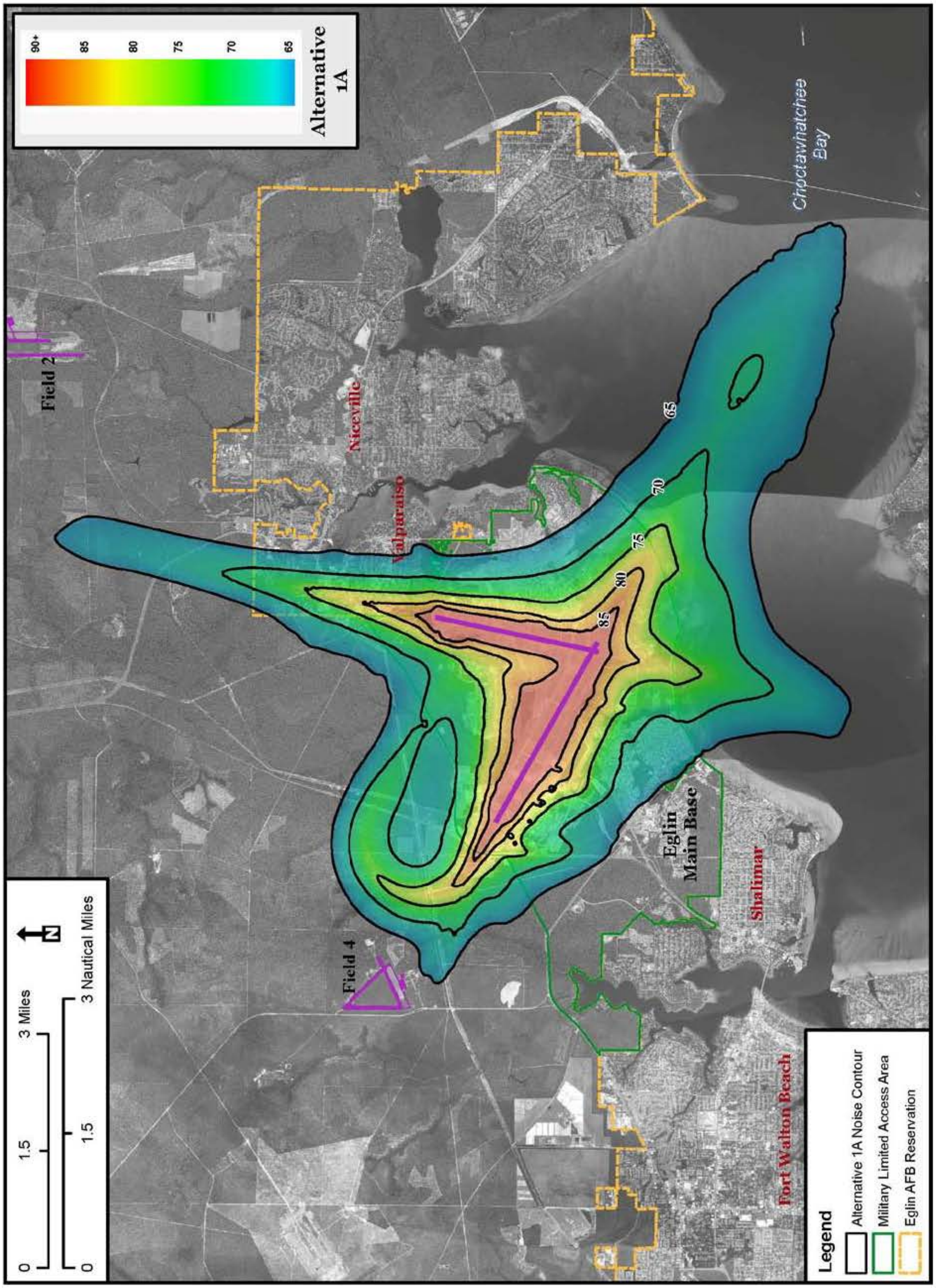


Figure 4-4. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Eglin Main Under Alternative 1A (Preferred Alternative)

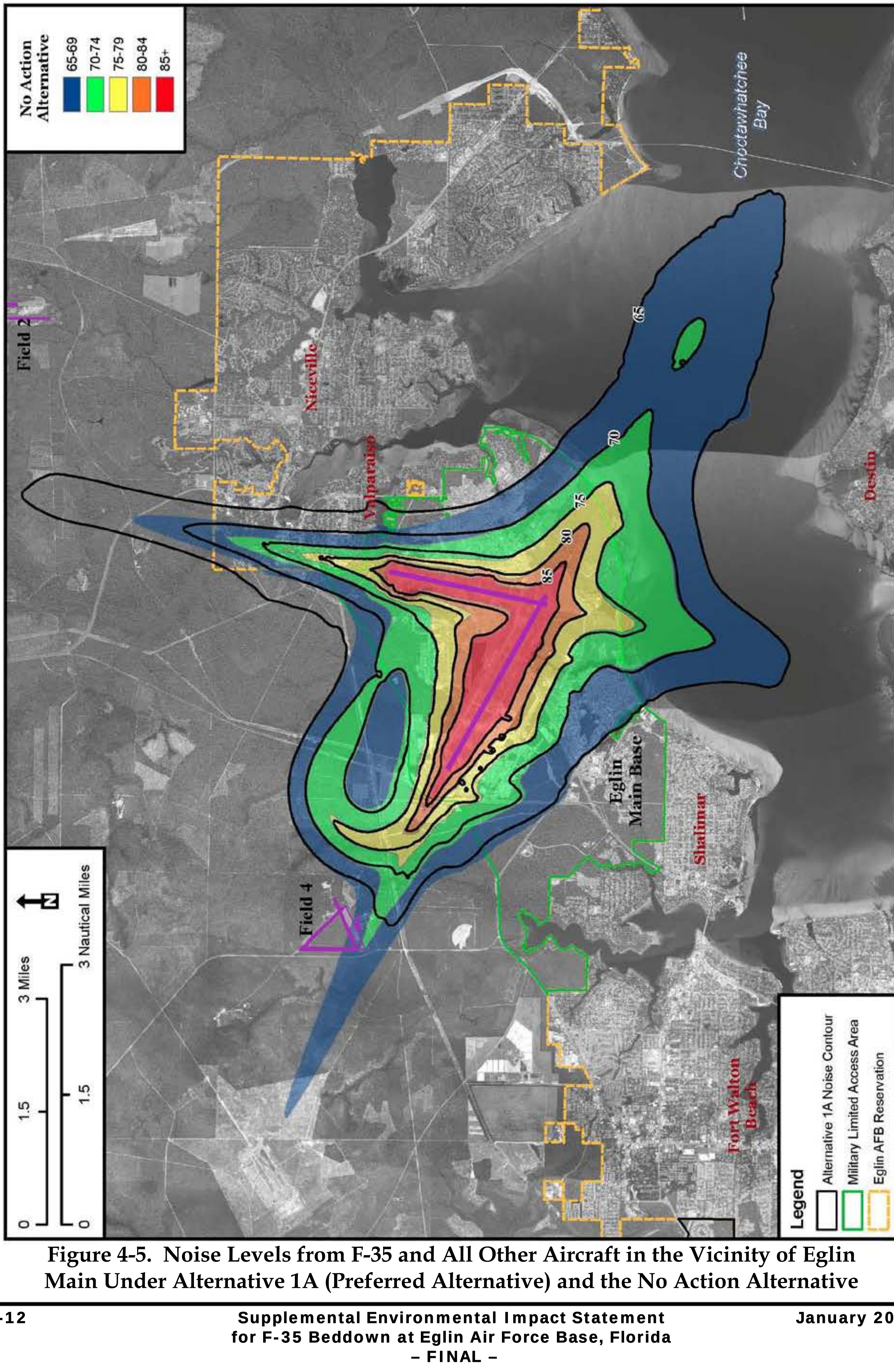


Figure 4-5. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Eglin Main Under Alternative 1A (Preferred Alternative) and the No Action Alternative

Potential Hearing Loss (PHL)

As discussed in Chapter 3 (Section 3.3.3, *Noise: Analysis Methodology*), hearing loss is a concern for persons exposed for long periods of time to elevated noise levels. The U.S. Department of Defense (DoD), the U.S. Air Force, and the National Institute for Occupational Safety and Health have established occupational noise exposure damage risk criteria for hearing loss that cover individuals working inside the base boundary in areas characterized by elevated noise levels. Workers are monitored closely to ensure that noise exposure does not exceed established thresholds. DoD policy for assessing hearing loss risk in persons not covered by DoD occupational noise exposure policies is stated in a June 2009 Office of the Secretary of Defense memorandum (DoD, 2009a). The policy memorandum establishes 80 dB DNL as the threshold above which PHL risk assessment should be conducted and states that the PHL risk assessment should be conducted as described in the U.S. Environmental Protection Agency (USEPA) document, *Guidelines for Noise Impact Analysis*.

PHL under Alternative 1A was assessed using the methodology described in Chapter 3 (Section 3.3.3, *Noise: Analysis Methodology*). Table 4-3 presents the results of the assessment and Figure 4-6 shows areas in which persons could potentially be at risk for PHL.

Table 4-3. Off-Installation Population Exposed to Noise Levels that Could Result in NIPTS Under Alternative 1A (Preferred Alternative)

Contour Band (dB DNL)	Estimated Population
80–81	38
81–82	22
82–83	21
83–84	14
84–85	2
85–86	0
86–87	0
87–88	0
88–89	0
89–90	0
Total	**97**

dB = decibels; DNL = day-night average sound level; NIPTS = Noise-Induced Permanent Threshold Shift

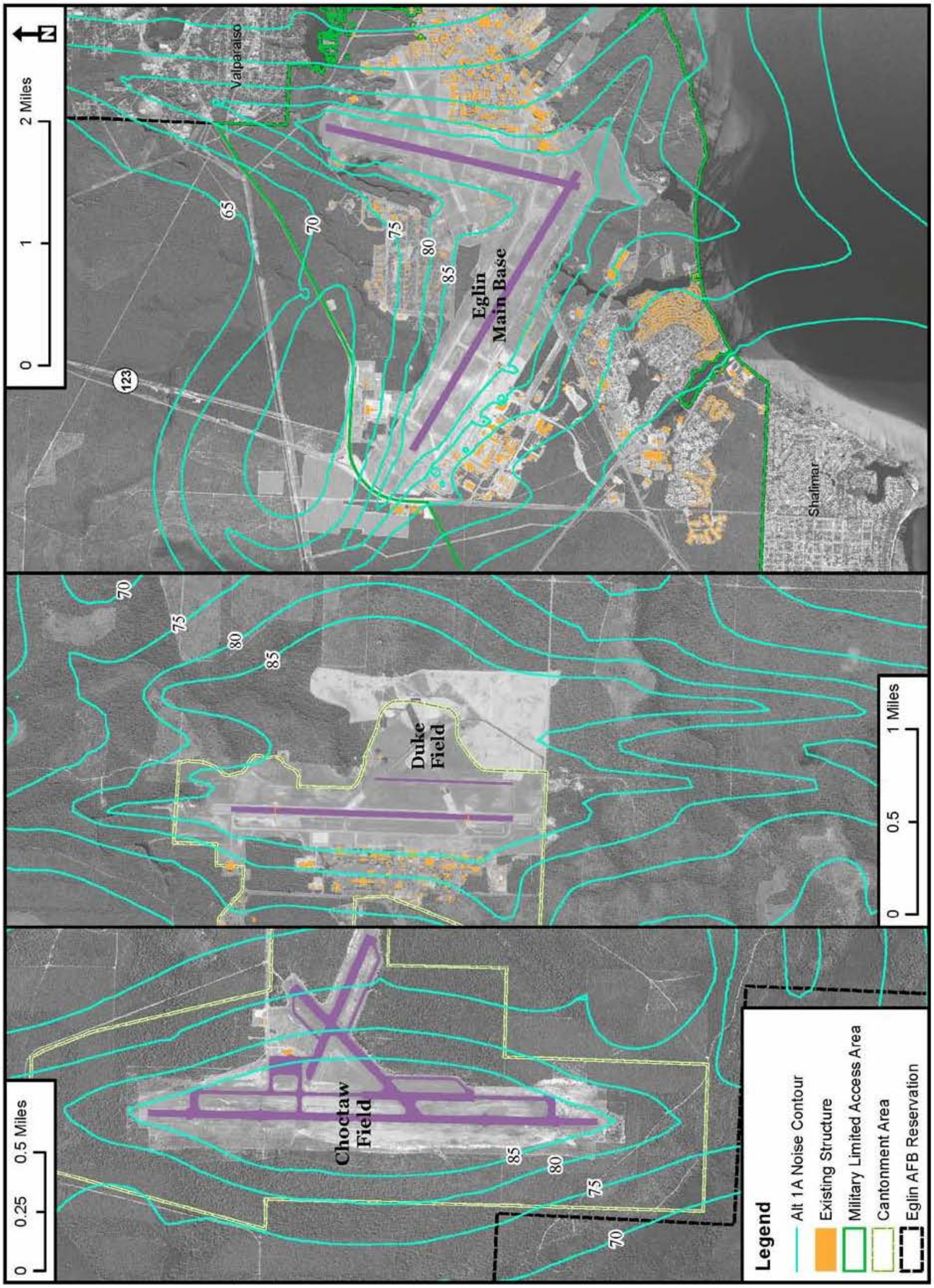


Figure 4-6. Potential Hearing Loss Risk Areas Under Alternative 1A (Preferred Alternative) from F-35 and All Other Aircraft

Under Alternative 1A, 153 on-installation buildings would be impacted by noise greater than 80 dB DNL on Eglin Main Base. On Duke Field and Choctaw Field, the same number of buildings would be impacted as under the No Action Alternative. None of the affected on-base buildings include residential housing. This information will be used by bioengineering staff as a baseline to evaluate PHL in and around facilities. The bioengineering staff is evaluating actual noise impacts to on-base areas and is implementing policies and procedures in accordance with Air Force Instruction (AFI) 91-301, *Air Force Occupational and Environmental Safety, Fire Protection and Health (AFOSH) Standards*, in particular AFOSH Standard 48-20, *Occupational Noise and Hearing Conservation Program*.

It is estimated that a total of 97 individuals surrounding Eglin AFB may be exposed to aircraft noise 80 dB DNL or greater (Table 4-3) under Alternative 1A. These individuals could experience as much as a 3.0 dB Average Noise-Induced Permanent Threshold Shift (NIPTS) in their hearing were they to remain in that location and under those same conditions for 40 years. Likewise, the most sensitive 10 percent of the 97 individuals would be expected to experience no more degradation to their hearing than an Average NIPTS hearing loss of 7.0 dB.

Non-auditory effects, such as high blood pressure, coronary disease, ulcers, colitis, and migraine headaches, have been linked to noise and are possible in areas exposed to elevated noise levels. Noise is generally viewed as being one of a number of general biological stressors, and it is often difficult to determine whether noise has contributed to development of any particular health condition. Kryter (1980) states, "It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior than it is from the noise eliciting, because of its intensity, reflexive response in the automatic or other physiological systems in the body." Currently available studies on the non-auditory impacts of noise are contradictory, and no accepted noise level threshold exists below which non-auditory effects can be entirely discounted.

Structural Vibration Due to Noise

Noticeable structural vibration may result from low-altitude JSF overflights. Normally, the components of a structure most sensitive to airborne noise are windows and, less frequently, plastered walls and ceilings. While certain frequencies may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (CHABA, 1977). Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations (i.e., rattling of objects within the dwelling, such as hanging pictures).

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Table 4-4 describes aircraft noise levels at several noise-sensitive locations under the No Action Alternative and Alternative 1A using the DNL metric, which reflects noise over the course of an entire day, and the sound exposure level (SEL) metric, which reflects the noise generated by a single overflight event. Because overflight noise levels vary depending on where and how the aircraft is flying, as well as ambient atmospheric conditions, any given location is exposed to a wide range of individual aircraft overflight noise levels. The loudest and most frequent types of overflights, particularly types of flights conducted frequently during the late night (10:00 PM to 7:00 AM), play a dominant role in determining overall DNL noise levels and people's reactions to the noise environment. At each noise-sensitive location, all of the flights in the NOISEMAP model for Alternative 1A were ranked based on their contribution to overall DNL noise level at that location. Table 4-4 states the range of SEL values for the top 20 contributors. Individual overflights at these locations may exceed the maximum SEL value of the range stated in Table 4-4. However, such overflights would not occur at sufficient frequency to contribute significantly to the overall noise level.

Additional details regarding the overflights contributing most to overall noise levels at each of the sensitive receptors listed in Table 4-4 can be found in the Appendix E table, entitled "Top Contributor Flight Profiles to Overall Time-Averaged Noise Levels at Representative Noise-Sensitive Locations Under Alternative 1A." A map showing these locations can be found in Chapter 3 (Figure 3-6).

Under Alternative 1A, several noise-sensitive locations north of Eglin Main Base would experience increases in DNL of up to 7 dB; these increases could result in increases in annoyance and frequency of activity interference. Noise levels at the locations studied near Duke Field and Choctaw Field would not increase. Individual overflight noise levels (i.e., SEL) would be similar in most locations under Alternative 1A and the No Action Alternative. The same aircraft types (including the JSF) would fly under both alternatives, with the differences being the location and frequency of flying operations.

Table 4-4. Representative Noise-Sensitive Receptors Under Alternative 1A (Preferred Alternative)[1]

Location ID	General Description	No Action Alternative		Alternative 1A	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP01	Eglin Housing (Capehart)	70	108	70	92–108
SP02	Eglin Housing (Ben's Lake)	70	108	70	96–108
SP03	Chapel 2 - building 2574	70	111	70	94–111
SP04	Cherokee Elementary School	70	110	70	96–110
SP05	Child Development Center	72	112	72	97–112
SP06	Oakhill School (closed in 2009)	77	117	76	102–117
SP07	Eglin Hospital	64	107	64	89–107

Table 4-4. Representative Noise-Sensitive Receptors Under Alternative 1A (Preferred Alternative)[1], Cont'd

Location ID	General Description	No Action Alternative		Alternative 1A	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP08	Eglin VAQ and Dorms	69	106	70	91–106
SP09	Eglin Chapel 1	66	102	67	87–102
SP10	Joint Strike Fighter Academic Training Facility	76	115	76	101–115
SP11	Lewis Middle School	62	99	63	84–99
SP12	Okaloosa STEMM Center (Valparaiso)[3]	65	111	72	95–111
SP13	First Assembly of God (Valparaiso)	68	115	75	99–115
SP14	New Hope Baptist (Valparaiso)	68	115	74	99–115
SP15	Sovereign Grace Church (Valparaiso)	63	107	69	92–107
SP16	First Baptist Church (Valparaiso)	62	105	67	92–105
SP17	Unitarian Church (Valparaiso)	58	100	63	88–101
SP18	#1 Housing (Valparaiso)	68	114	75	100–114
SP19	#2 Housing (Valparaiso)	71	119	76	102–121
SP20	Edge Elementary School	58	105	63	89–105
SP21	Twin Cities Medical Center	60	108	65	92–108
SP22	Niceville Community Church	74	123	77	103–123
SP23	Private School (Niceville)	78	126	80	98–126
SP24	Private School (Fort Walton)	55	99	55	74–99
SP25	Okaloosa Walton College	53	95	52	72–95
SP26	Kenwood Elementary	54	97	54	73–97
SP27	Pryor Middle School	53	95	52	71–95
SP28	Housing (Fort Walton Beach)	55	99	55	74–99
SP29	Residential property south of Hwy 90 in Crestview	49	92	49	72–92
SP30	Shalimar Elementary School	58	103	56	75–103
SP31	Shalimar Residential	60	103	58	81–103
SP32	Residential Poquito Bayou West Side	58	100	56	75–101
SP33	University of Florida Research and Engineering Education Facility	63	110	62	84–110
SP34	Eglin Air Force Base, building 1 (Air Armament Center [AAC] Headquarters)	70	107	70	91–107
SP35	Eglin Air Force Base, building 6 (Air Base Wing Headquarters)	74	112	75	96–112
SP36	Eglin Law Center (building 2)	75	113	76	97–113
SP37	Saint Sylvester Catholic Church, Gulf Breeze	<45	75	<45	51–75
SP38	Residential, north of Choctaw	<45	77	<45	54–77
SP39	Residential, south of Choctaw	48	84	48	62–84
SP40	Okaloosa County Prison	60	109	60	85–109

dB = decibels; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools, hospitals, and churches presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.
2. Top 20 SEL refers to the range of SEL decibel noise levels generated by the 20 profiles that contribute most to overall DNL noise level at that location. Refer to Appendix E, *Noise*, for tables that describe the top 20 profiles.
3. Previously Valparaiso Elementary School.

Note: Calculated military noise below the DNL ambient sound level of 45 dB is listed as <45 dB.

Equivalent Sound Level (L_{eq}) at Representative Local Schools

Good acoustical qualities are essential in classrooms in which speech communication is an important part of the learning process. Excessive background noise interferes with speech communication and thus presents an acoustical barrier to learning. The American National Standards Institute's (ANSI) *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools* provides "acoustical performance criteria, design requirements, and design guidelines for new school classrooms and other learning spaces" (ANSI, 2009). While this standard is not a requirement to be followed by school systems, it is applicable as a design guideline to new construction as well as renovations of existing facilities and is recommended to achieve a high degree of speech intelligibility in learning spaces. Because this ANSI standard was not finalized until 2009, all schools constructed or renovated before that date would not necessarily meet the recommended criteria.

The ANSI standard identifies an appropriate set of criteria for maximizing speech intelligibility in schools as an indoor equivalent sound level (L_{eq}) of 40 A-weighted decibels (dBA) (for intermittent noise from transportation sources such as aircraft operations). To compare the outdoor noise levels with indoor recommended values, outdoor noise levels are adjusted to account for the noise level reduction (NLR) provided by the structure. Typical NLR values are 15 dB with windows open and 25 dB with windows closed, but vary by structure, climate, and noise sources. It is assumed that each of the schools within the region of influence (ROI) maintains a "windows closed" condition and provides approximately 25 dB NLR.

Table 4-5 lists the minimum and maximum estimated indoor hourly L_{eq} values under Alternative 1A during a typical school day (7:00 AM – 4:00 PM, Monday–Friday) at several schools located near Eglin Main Base. The minimum and maximum hourly L_{eq} values provide the expected range of noise levels to which the schools could be exposed on a typical day. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI standard for at least a portion of one hour during a typical school day. The Appendix E table, entitled "Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 1A," lists hourly L_{eq} for each hour of the school day, giving some indication as to which hours of the day might be more disruptive of learning.

Table 4-5. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 1A (Preferred Alternative)[1]

Location ID	General Description	Minimum Indoor Hourly L_{eq}[2]	Maximum Indoor Hourly L_{eq}[2]
SP04	Cherokee Elementary School	<=40	49
SP05	Child Development Center	42	51
SP06	Oakhill School (closed in 2009)	46	55
SP11	Lewis Middle School	<=40	42
SP12	Okaloosa STEMM Center (Valparaiso)[3]	42	50
SP20	Edge Elementary School	<=40	42
SP23	Private School (Niceville)	49	58
SP24	Private School (Fort Walton)	<=40	<=40
SP26	Kenwood Elementary	<=40	<=40
SP27	Pryor Middle School	<=40	<=40
SP30	Shalimar Elementary School	<=40	<=40

ANSI = American National Standards Institute; dB = decibels; ID = identification code; L_{eq} = equivalent sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools presented in this table are provided to help understand the noise environment. As such, this table may not include all schools that are affected by noise contours.
2. Indoor L_{eq} is assumed to be 25 decibels less than outdoor L_{eq} due to the noise level reduction provided by the structure with windows closed. Actual outdoor-to-indoor noise level reduction varies from school to school and between locations within individual schools.
3. Previously Valparaiso Elementary School.

Note: Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <=40 dB.

The locations of the assessed schools are shown in Chapter 3 (Figure 3-6). Under Alternative 1A, four active schools, an educational center, and a daycare would be expected to exceed the recommended noise guidelines. Oakhill School closed in 2009 due to factors not related to noise.

Noise impacts on property values are discussed in Section 4.5, *Socioeconomics and Environmental Justice*. Impacts on noise-sensitive land use types (e.g., residential areas) are discussed in Section 4.4, *Land Use*.

Number of Noise Events Analysis

Table 4-6 provides a list of locations and the number of times during a day that one might experience disruption of communications or activities based on the possible number of noise events exceeding a maximum sound level (L_{max}) of 50 dB from all flight operations (including non-JSF operations) under the No Action Alternative and under Alternative 1A. For example, an individual living in Eglin's Capehart housing (SP01) would typically experience as many as 159 disruptive events per day under the No Action Alternative, while under Alternative 1A the resident could experience as many as 161 disruptive events each day.

Table 4-6. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 1A

Location ID	Location of Interest	No Action Alternative	Alternative 1A
SP01	Eglin Housing (Capehart)	159	161
SP02	Eglin Housing (Ben's Lake)	157	151
SP03	Chapel 2 - building 2574	151	144
SP04	Cherokee Elementary School	156	149
SP05	Child Development Center	155	157
SP06	Oakhill School (closed in 2009)	162	163
SP07	Eglin Hospital	119	112
SP08	Eglin VAQ and Dorms	135	138
SP09	Eglin Chapel 1	127	133
SP10	Joint Strike Fighter Academic Training Facility	168	159
SP11	Lewis Middle School	109	115
SP12	Okaloosa STEMM Center (Valparaiso)	121	142
SP13	First Assembly of God (Valparaiso)	133	153
SP14	New Hope Baptist (Valparaiso)	124	145
SP15	Sovereign Grace Church (Valparaiso)	114	135
SP16	First Baptist Church (Valparaiso)	109	130
SP17	Unitarian Church (Valparaiso)	36	61
SP18	#1 Housing (Valparaiso)	134	155
SP19	#2 Housing (Valparaiso)	90	115
SP20	Edge Elementary School	18	44
SP21	Twin Cities Medical Center	22	47
SP22	Niceville Community Church	113	138
SP23	Private School (Niceville)	121	146
SP24	Private School (Fort Walton)	20	15
SP25	Okaloosa Walton College	10	8
SP26	Kenwood Elementary	16	11
SP27	Pryor Middle School	12	10
SP28	Housing (Fort Walton Beach)	19	14
SP29	Residential property south of Hwy 90 in Crestview	7	7
SP30	Shalimar Elementary School	23	18
SP31	Shalimar Residential	40	38
SP32	Residential Poquito Bayou West Side	26	20
SP33	University of Florida Research and Engineering Education Facility	73	63
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	137	140
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	163	165
SP36	Eglin Law Center (building 2)	168	169
SP37	Saint Sylvester Catholic Church, Gulf Breeze	0	0
SP38	Residential, north of Choctaw	0	0
SP39	Residential, south of Choctaw	1	1
SP40	Okaloosa County Prison	41	41

< = less than; dB = decibels; DNL = day-night average sound level; HQ = Headquarters; Hwy = Florida Highway; ID = identification code; L_{max} = maximum sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

4.3.2.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Flight Operations

Day-Night Average Sound Level (DNL)

Under Alternative 1I, the expected frequency of afterburner departures and aircraft operations between 10:00 PM and 7:00 AM would be as shown in Table 4-7. Afterburner departures generate more noise than non-afterburner departures, and flights during the "late night" time period between 10:00 PM and 7:00 AM would be more likely to disturb sleep or other activities that require a quiet environment.

Table 4-7. Afterburner Departures and "Late Night" Flying Operations (10:00 PM - 7:00 AM) Under Alternative 1I

Operation	Eglin Main		Duke Field		Choctaw Field	
	% Afterburner	% Late Night	% Afterburner	% Late Night	% Afterburner	% Late Night
Departures	17%	0%	0%	1%	0%	1%
Arrivals	n/a	3%	n/a	1%	n/a	1%
Closed Patterns	n/a	0%	n/a	1%	n/a	2%

Note: The numbers listed in the table represent the percentage of total operations at each airfield.

Noise contours under Alternative 1I are depicted in Figure 4-7. Noise levels from F-35 and all other aircraft in the vicinity of Eglin Main Base under Alternative 1I are depicted in Figure 4-8. Noise levels in the vicinity of Eglin Main Base under Alternative 1I *and* the No Action Alternative are depicted in Figure 4-9.

Table 4-8 lists the on-base acreage, off-base acreage, estimated off-base population, and residential parcels impacted by various noise levels in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field under Alternative 1I.

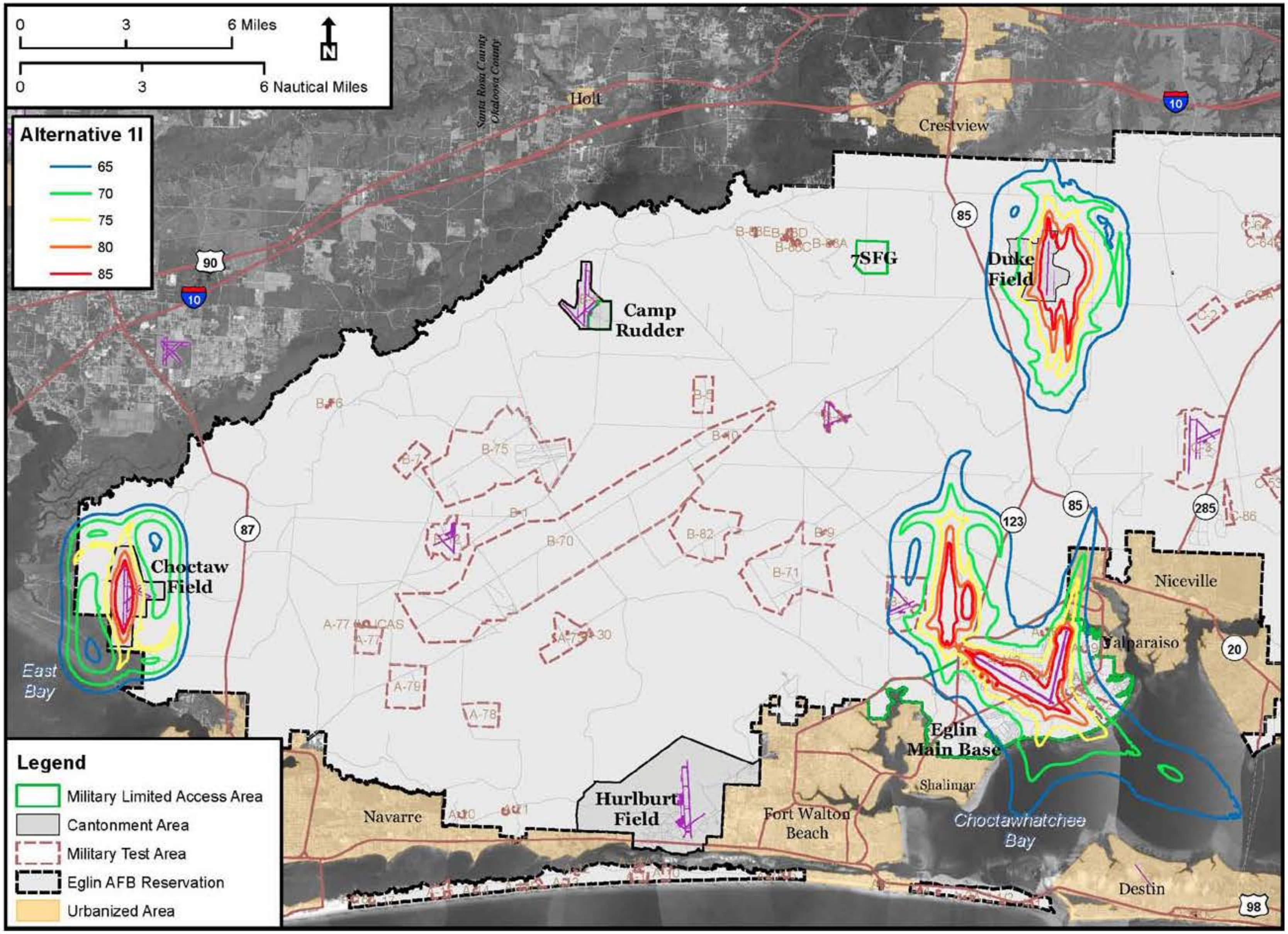


Figure 4-7. Noise Contours from F-35 and All Other Aircraft Under Alternative 1I
in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field

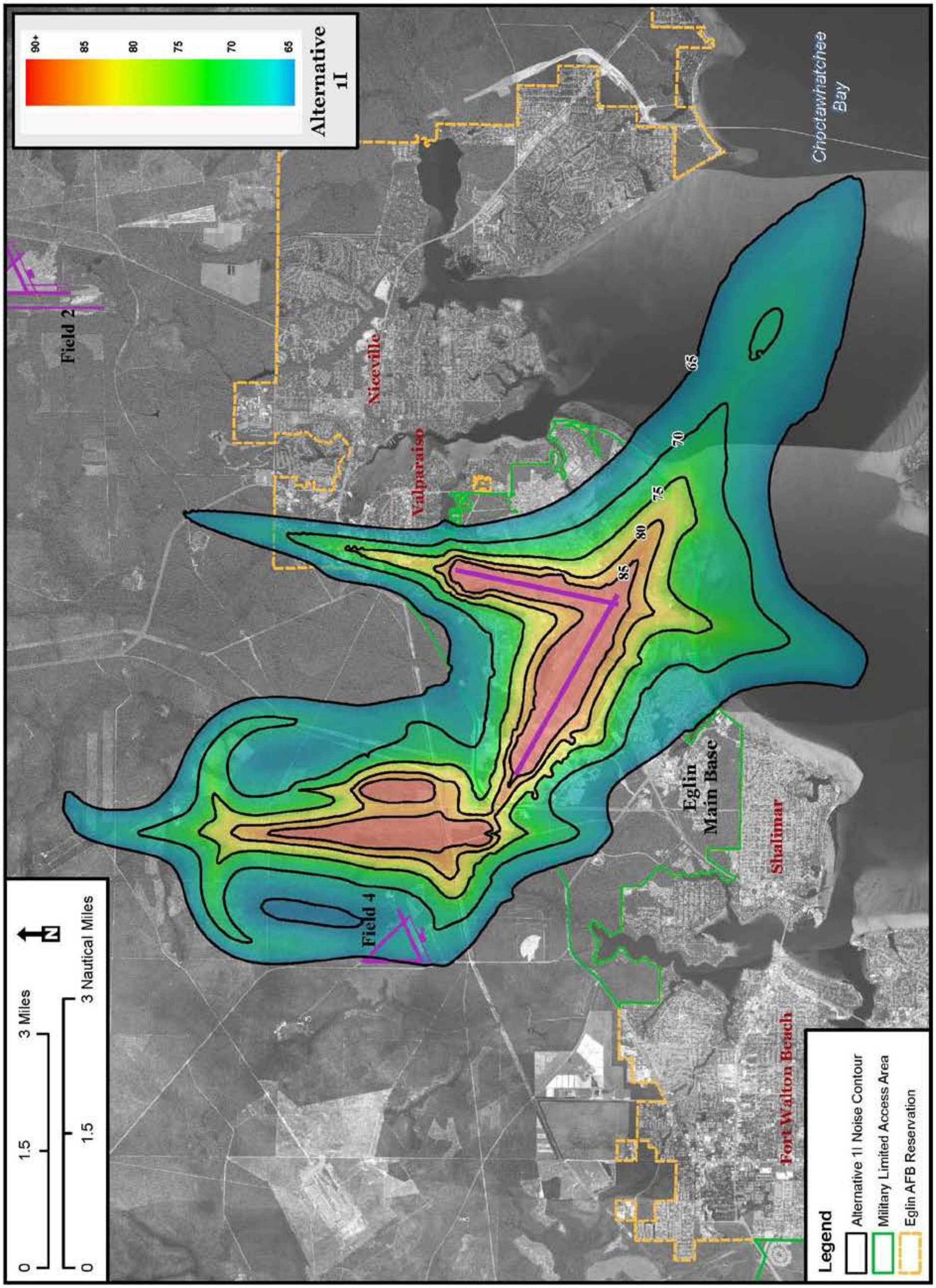


Figure 4-8. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Eglin Main Under Alternative 1I

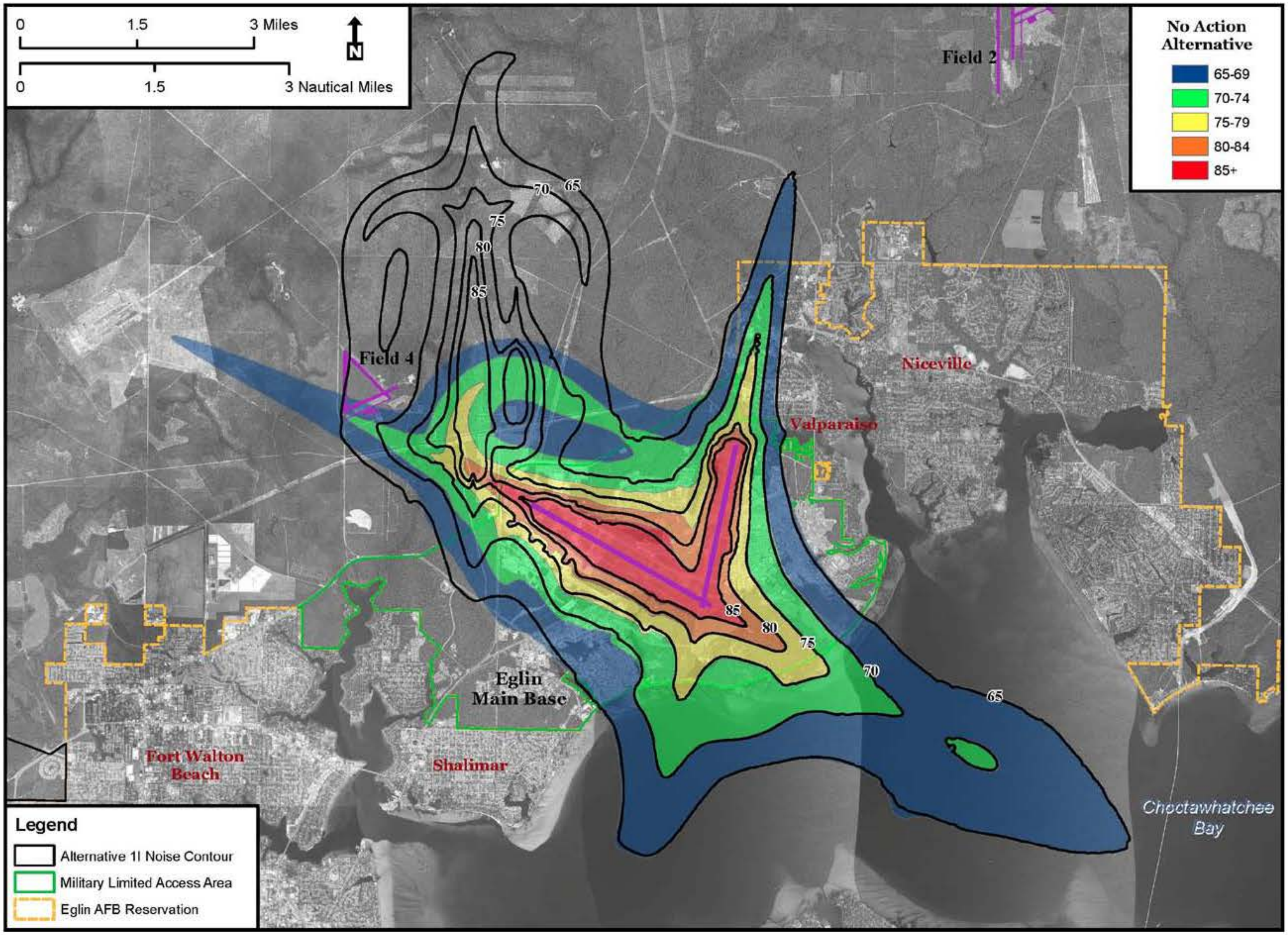


Figure 4-9. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Eglin Main Under Alternative 1I and the No Action Alternative

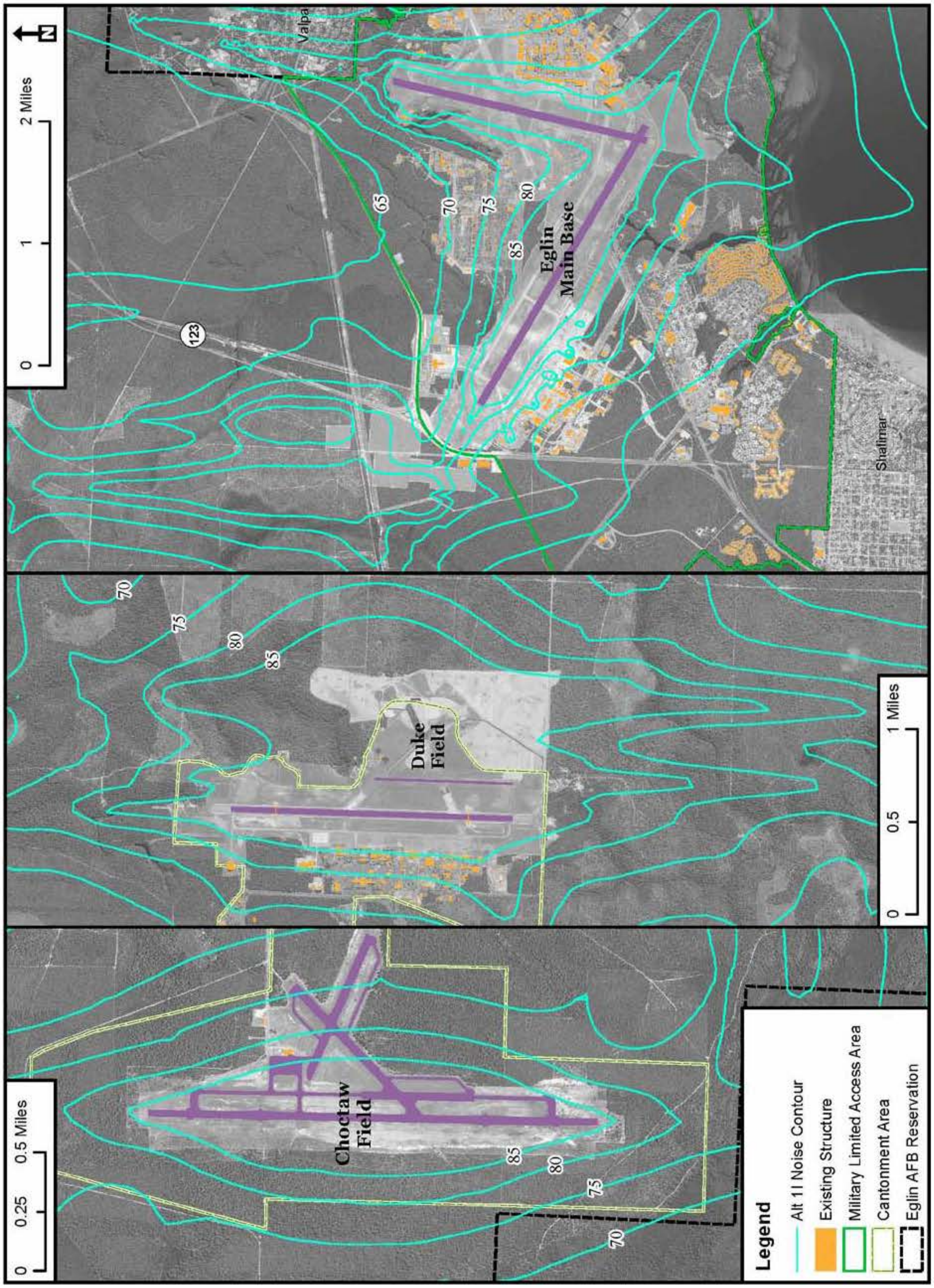


Figure 4-10. Potential Hearing Loss Risk Areas Under Alternative 1I from F-35 and All Other Aircraft

Table 4-8. Acreage and Population Affected by Elevated Noise Levels Under Alternative 1I in the Vicinity of Airfields

Noise Level (dB DNL)	Acres OFF-Installation by Airfield			TOTAL Acres OFF-Installation	TOTAL Acres ON-Installation	Population OFF-Installation by Airfield			TOTAL Population OFF-Installation	Total Residential Parcels
	EGLIN	DUKE	CHOCTAW			EGLIN	DUKE	CHOCTAW		
65–69	372 ↓1	1 ■0	1,233 ■0	1,606 ↓1	15,284 ↑4,826	964 ↓24	1 ■0	2 ■0	967 ↓24	409 ↓4
70–74	244 ↑7	0 ■0	836 ■0	1,080 ↑7	10,562 ↓1,563	668 ↑33	0 ■0	0 ■0	668 ↑33	252 ↑26
75–79	100 ↑17	0 ■0	57 ■0	157 ↑17	5,125 ↑607	226 ↑52	0 ■0	0 ■0	226 ↑52	67 ↑14
80–84	0 ■0	0 ■0	0 ■0	0 ■0	2,963 ↑480	0 ■0	0 ■0	0 ■0	0 ■0	0 ■0
>=85	0 ■0	0 ■0	0 ■0	0 ■0	3,915 ↑512	0 ■0	0 ■0	0 ■0	0 ■0	0 ■0
TOTAL	716 ↑23	1 ■0	2,126 ■0	2,843 ↑23	37,849 ↑4,862	1,858 ↑61	1 ■0	2 ■0	1,861 ↑61	728 ↑36

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Note: Acreage estimations do not include areas covered by water. Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

Impacts associated with implementing Alternative 1I would be similar in type (e.g., annoyance, activity interference, possible health impacts) to impacts described for Alternative 1A but would differ in the acreage and population impacted.

The number of acres affected by off-installation noise greater than 65 dB DNL would increase by 23 at Eglin Main Base, with no increase in affected acres at Duke and Choctaw Fields. Under Alternative 1I, the number of off-installation residents affected by noise levels between 65 and 75 dB DNL would increase from 1,623 to 1,632 near Eglin AFB. The number affected by noise exceeding 75 dB DNL would increase from 174 to 226 relative to the No Action Alternative. The number of off-installation residents near Duke Field and Choctaw Field impacted by 65 to 75 dB DNL would remain the same.

Potential Hearing Loss (PHL)

PHL under Alternative 1I was assessed using the methodology described previously. Figure 4-10 shows areas in which persons could potentially be at risk for PHL.

Under Alternative 1I, 110 on-installation buildings would be impacted by noise greater than 80 dB DNL on Eglin Main Base. On Duke Field and Choctaw Field, the same numbers of buildings would be impacted as under the No Action Alternative and Alternative 1A. None of the affected on-base buildings include residential housing. The number of on-base personnel at risk for PHL will be analyzed in a separate study, as discussed under Alternative 1A. Under Alternative 1I, no persons residing off-installation could be exposed to noise levels 80 dB DNL or greater.

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Aircraft noise levels at several noise-sensitive locations under the No Action Alternative and Alternative 1I are listed in Table 4-9. Noise levels are expressed as the overall DNL at the site and the range of individual overflight noise levels (SEL metric) of the 20 types of flights that contribute most to the overall DNL noise level. Individual overflights may exceed the maximum SEL value of the range stated in Table 4-9, but such overflights would be relatively rare occurrences. Additional details regarding the types of flights contributing most to overall noise levels can be found in the Appendix E table, entitled "Top Contributor Flight Profiles to Overall Time-Averaged Noise Levels at Representative Noise-Sensitive Locations Under Alternative 1I." A map showing the representative noise-sensitive locations can be found in Chapter 3 (Figure 3-6).

Under Alternative 1I, noise levels at noise-sensitive locations would increase by up to 3 dB (Table 4-9). However, at the majority of the noise-sensitive locations studied, DNL noise levels would increase by less than 1 dB, or even decrease relative to the No Action Alternative. The range of top contributor SEL values to which the majority of locations would be exposed would not change substantially. The University of Florida Research and Engineering Education Facility and Shalimar Elementary School would experience substantially higher overflight noise levels than under the No Action Alternative.

Equivalent Sound Level (L_{eq}) at Representative Local Schools

Table 4-10 lists the indoor hourly L_{eq} under Alternative 1I during a typical school day (7:00 AM – 4:00 PM, Monday–Friday) at several schools located near Eglin Main Base. The minimum and maximum hourly L_{eq} values provide the expected range of noise levels to which the schools could be exposed on a typical day. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI standard for at least a portion of one hour during a typical school day. The Appendix E table, entitled "Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 1I," lists hourly L_{eq} for each hour of the school day, giving some indication as to which hours of the day might be more disruptive of learning.

The locations of the assessed schools are shown in Figure 3-6. Under Alternative 1I, two active schools, an educational center, and a daycare would exceed the recommended noise guidelines. Oakhill School closed in 2009 due to factors not related to noise.

Table 4-9. Representative Noise-Sensitive Receptors Under Alternative 1I[1]

Location ID	General Description	No Action		Alternative 1I	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP01	Eglin Housing (Capehart)	70	108	70	92–108
SP02	Eglin Housing (Ben's Lake)	70	108	69	96–108
SP03	Chapel 2 - building 2574	70	111	69	94–111
SP04	Cherokee Elementary School	70	110	69	96–110
SP05	Child Development Center	72	112	71	99–111
SP06	Oakhill School (closed in 2009)	77	117	76	104–116
SP07	Eglin Hospital	64	107	63	89–102
SP08	Eglin VAQ and Dorms	69	106	69	91–106
SP09	Eglin Chapel 1	66	102	66	87–102
SP10	Joint Strike Fighter Academic Training Facility	76	115	75	102–115
SP11	Lewis Middle School	62	99	62	84–99
SP12	Okaloosa STEMM Center (Valparaiso)[3]	65	111	66	83–113
SP13	First Assembly of God (Valparaiso)	68	115	69	89–117
SP14	New Hope Baptist (Valparaiso)	68	115	69	89–117
SP15	Sovereign Grace Church (Valparaiso)	63	107	64	81–109
SP16	First Baptist Church (Valparaiso)	62	105	62	81–106
SP17	Unitarian Church (Valparaiso)	58	100	58	75–100
SP18	#1 Housing (Valparaiso)	68	114	69	87–116
SP19	#2 Housing (Valparaiso)	71	119	72	89–121
SP20	Edge Elementary School	58	105	59	84–105
SP21	Twin Cities Medical Center	60	108	60	81–108
SP22	Niceville Community Church	74	123	74	85–123
SP23	Private School (Niceville)	78	126	78	96–126
SP24	Private School (Fort Walton)	55	99	55	74–99
SP25	Okaloosa Walton College	53	95	53	72–95
SP26	Kenwood Elementary	54	97	54	73–97
SP27	Pryor Middle School	53	95	52	71–95
SP28	Housing (Fort Walton Beach)	55	99	55	74–99
SP29	Residential property south of Hwy 90 in Crestview	49	92	49	72–92
SP30	Shalimar Elementary School	58	103	56	75–103
SP31	Shalimar Residential	60	103	57	75–100
SP32	Residential Poquito Bayou West Side	58	100	56	75–101
SP33	University of Florida Research and Engineering Education Facility	63	110	65	95–115
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	70	107	69	91–107
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	74	112	74	96–112
SP36	Eglin Law Center (building 2)	75	113	75	97–113
SP37	Saint Sylvester Catholic Church, Gulf Breeze	<45	75	<45	51–75
SP38	Residential, north of Choctaw	<45	77	<45	54–77
SP39	Residential, south of Choctaw	48	84	48	62–84
SP40	Okaloosa County Prison	60	109	60	85–109

dB = decibels; DNL = day-night average sound level; HQ = Headquarters; SEL = sound exposure level; ID = identification code; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools, hospitals, and churches presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours
2. Top 20 SEL refers to the range of SEL decibel noise levels generated by the 20 profiles that contribute most to overall DNL noise level at that location. Refer to Appendix E, *Noise*, for tables that describe the top 20 profiles.
3. Previously Valparaiso Elementary School.

Note: Calculated military noise below the DNL ambient sound level of 45 dB is listed as <45 dB.

Table 4-10. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 1I[1]

Location ID	General Description	Minimum Indoor Hourly L_{eq}[2]	Maximum Indoor Hourly L_{eq}[2]
SP04	Cherokee Elementary School	<=40	48
SP05	Child Development Center	41	50
SP06	Oakhill School (closed in 2009)	46	54
SP11	Lewis Middle School	<=40	<=40
SP12	Okaloosa STEMM Center (Valparaiso)[3]	<=40	45
SP20	Edge Elementary School	<=40	<=40
SP23	Private School (Niceville)	47	56
SP24	Private School (Fort Walton)	<=40	<=40
SP26	Kenwood Elementary	<=40	<=40
SP27	Pryor Middle School	<=40	<=40
SP30	Shalimar Elementary School	<=40	<=40

ANSI = American National Standards Institute; ID = identification code; L_{eq} = equivalent sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools presented in this table are provided to help understand the noise environment. As such, this table may not include all schools that are affected by noise contours.
2. Indoor L_{eq} is assumed to be 25 decibels less than outdoor L_{eq} due to the noise level reduction provided by the structure with windows closed. Actual outdoor-to-indoor noise level reduction varies from school to school and between locations within individual schools.
3. Previously Valparaiso Elementary School.

Note: Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <=40 dB

Number of Noise Events Analysis

Table 4-11 provides a list of locations and the number of times during a day that one might experience disruption of communications or activities based on the possible number of noise events exceeding an L_{max} of 50 dB from all flight operations (including non-JSF operations) under the No Action Alternative and under Alternative 1I. For example, an individual living in Eglin's Capehart housing (SP01) would typically experience as many as 159 disruptive events per day under the No Action Alternative, while under Alternative 1I the resident could experience as many as 134 disruptive events each day.

Table 4-11. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 1I

Location ID	Location of Interest	No Action Alternative	Alternative 1I
SP01	Eglin Housing (Capehart)	159	134
SP02	Eglin Housing (Ben's Lake)	157	128
SP03	Chapel 2 - building 2574	151	121
SP04	Cherokee Elementary School	156	124
SP05	Child Development Center	155	131
SP06	Oakhill School (closed in 2009)	162	132
SP07	Eglin Hospital	119	98
SP08	Eglin VAQ and Dorms	135	109
SP09	Eglin Chapel 1	127	105
SP10	Joint Strike Fighter Academic Training Facility	168	126
SP11	Lewis Middle School	109	88
SP12	Okaloosa STEMM Center (Valparaiso)	121	106
SP13	First Assembly of God (Valparaiso)	133	117
SP14	New Hope Baptist (Valparaiso)	124	109
SP15	Sovereign Grace Church (Valparaiso)	114	99
SP16	First Baptist Church (Valparaiso)	109	94
SP17	Unitarian Church (Valparaiso)	36	32
SP18	#1 Housing (Valparaiso)	134	115
SP19	#2 Housing (Valparaiso)	90	79
SP20	Edge Elementary School	18	20
SP21	Twin Cities Medical Center	22	24
SP22	Niceville Community Church	113	102
SP23	Private School (Niceville)	121	110
SP24	Private School (Fort Walton)	20	17
SP25	Okaloosa Walton College	10	8
SP26	Kenwood Elementary	16	12
SP27	Pryor Middle School	12	11
SP28	Housing (Fort Walton Beach)	19	17
SP29	Residential property south of Hwy 90 in Crestview	7	7
SP30	Shalimar Elementary School	23	18
SP31	Shalimar Residential	40	35
SP32	Residential Poquito Bayou West Side	26	20
SP33	University of Florida Research and Engineering Education Facility	73	59
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	137	111
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	163	129
SP36	Eglin Law Center (building 2)	168	133
SP37	Saint Sylvester Catholic Church, Gulf Breeze	0	0
SP38	Residential, north of Choctaw	0	0
SP39	Residential, south of Choctaw	1	1
SP40	Okaloosa County Prison	41	41

< = less than; dB = decibels; DNL = day-night average sound level; HQ = Headquarters; Hwy = Florida Highway; L_{max} = maximum sound level; ID = identification code; STEMM = Science, Technology, Engineering, Mathematics, and Medical

4.3.3 Alternative 2 – Duke Field

4.3.3.1 *Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field*

Flight Operations

Day-Night Average Sound Level (DNL)

Under Alternative 2A, the expected frequency of afterburner departures and aircraft operations between 10:00 PM and 7:00 AM would be as shown in Table 4-12**.** Afterburner departures generate more noise than non-afterburner departures, and flights during the "late night" time period between 10:00 PM and 7:00 AM would be more likely to disturb sleep or other activities that require a quiet environment.

Table 4-12. Afterburner Departures and "Late Night" Flying Operations (10:00 PM - 7:00 AM) Under Alternative 2A

Operation	Eglin Main		Duke Field		Choctaw Field	
	% Afterburner	% Late Night	% Afterburner	% Late Night	% Afterburner	% Late Night
Departures	n/a	n/a	59%	0%	0%	1%
Arrivals	n/a	n/a	n/a	2%	n/a	1%
Closed Patterns	n/a	n/a	n/a	2%	n/a	1%

n/a = not applicable

Note: The numbers listed in the table represent the percentage of total operations at each airfield.

Noise contours under Alternative 2A are depicted in Figure 4-11. Noise levels in the vicinity of Duke Field under Alternative 2A are depicted in Figure 4-12. Noise levels in the vicinity of Duke Field under Alternative 2A *and* the No Action Alternative are depicted in Figure 4-13. Table 4-13 lists the on-base acreage, off-base acreage, estimated off-base population, and residential parcels impacted by various noise levels in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field under Alternative 2A.

Impacts associated with implementing Alternative 2A would be similar in type (e.g., annoyance, activity interference, possible health impacts) to impacts described for Alternative 1A but would differ in the acreage and population impacted. Alternative 2A would have the least severe noise impacts overall of any of the SEIS alternatives.

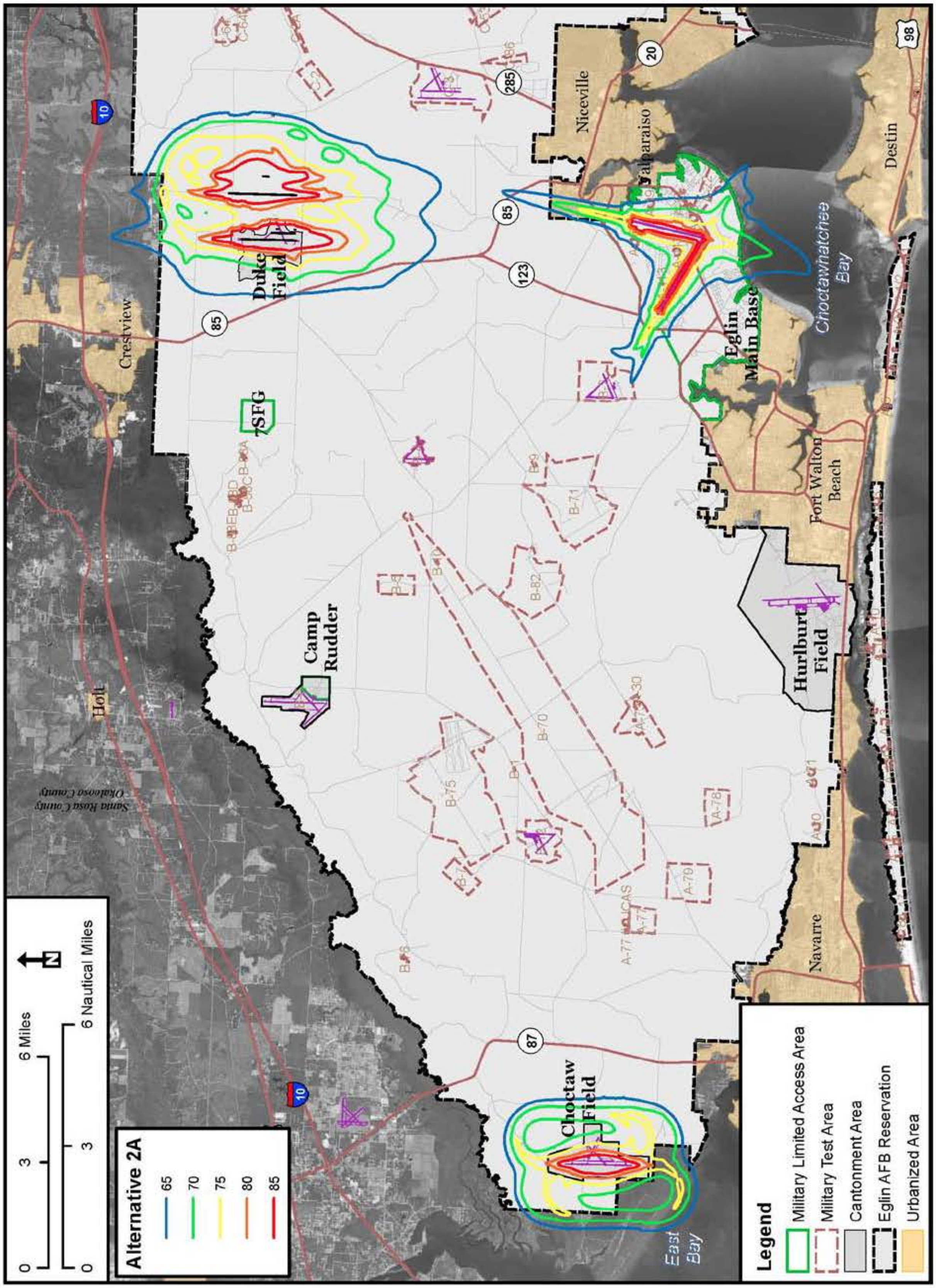


Figure 4-11. Noise Contours from F-35 and All Other Aircraft Under Alternative 2A in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field

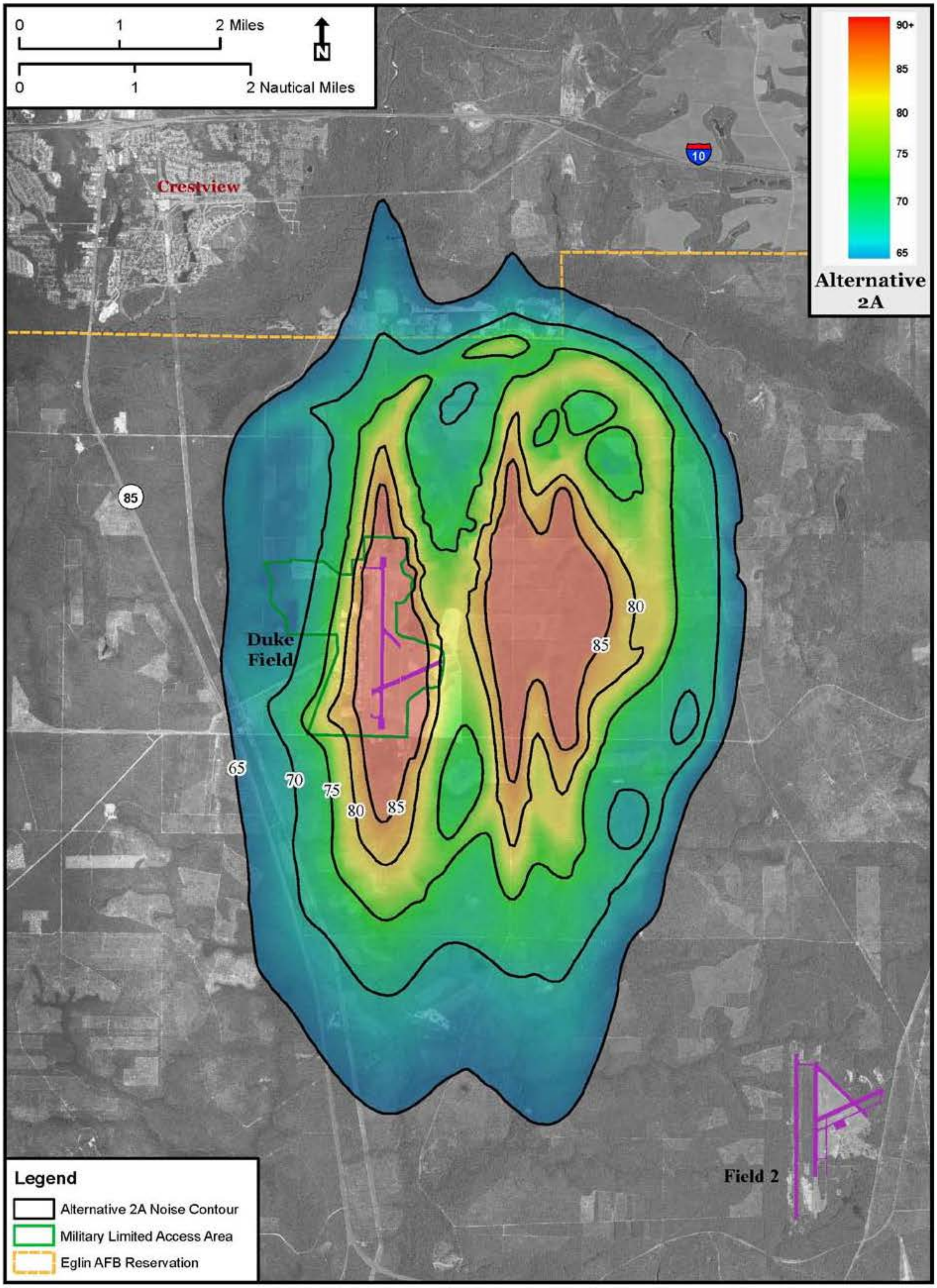


Figure 4-12. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2A

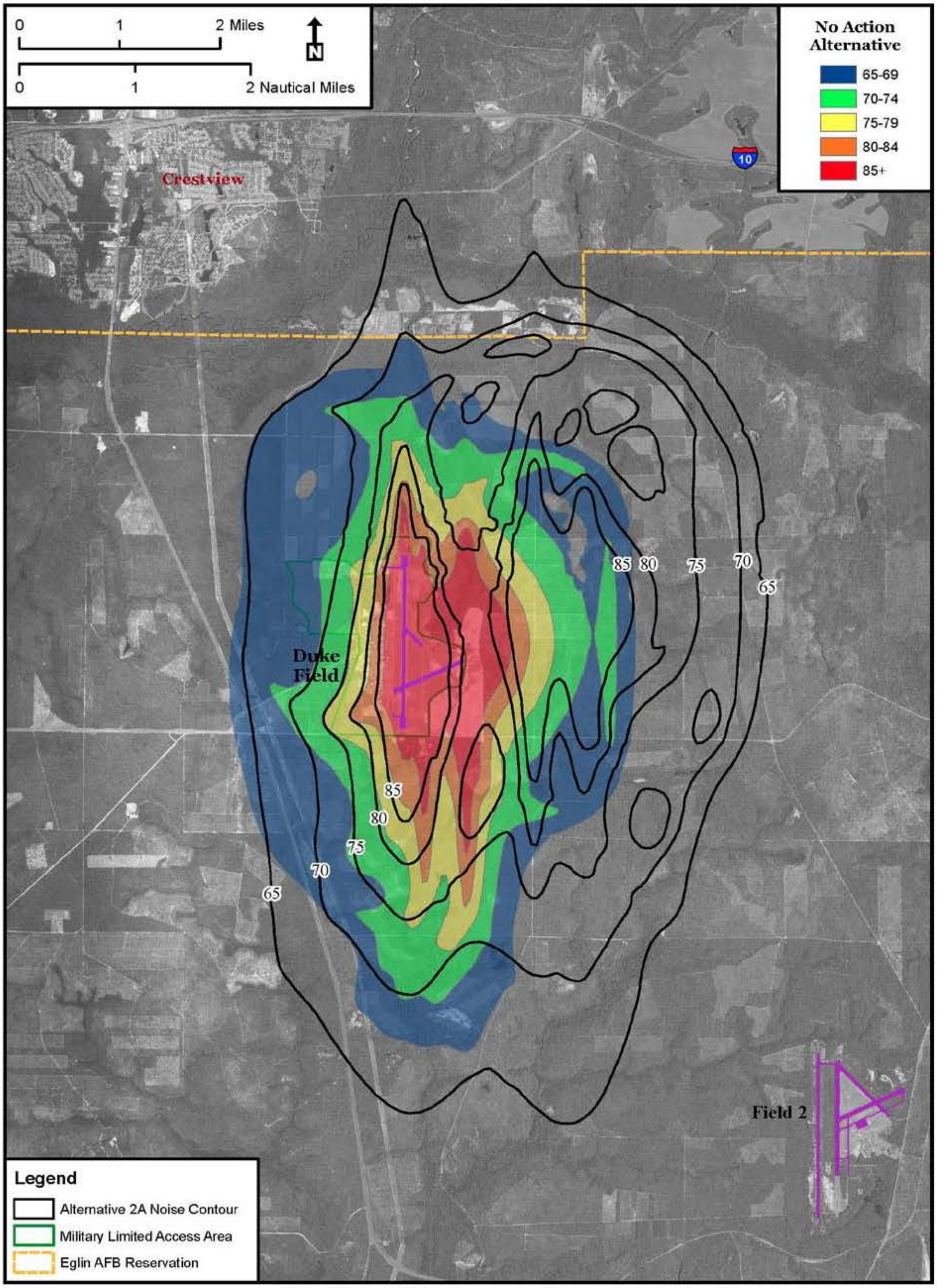


Figure 4-13. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2A and the No Action Alternative

Table 4-13. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2A

Noise Level (dB DNL)	Acres OFF-Installation by Airfield			TOTAL Acres OFF-Installation	TOTAL Acres ON-Installation	Population OFF-Installation by Airfield			TOTAL Population OFF-Installation	Total Residential Parcels
	EGLIN	DUKE	CHOCTAW			EGLIN	DUKE	CHOCTAW		
65–69	338 ↓35	808 ↑807	1,272 ↑39	2,418 ↑811	13,828 ↑3,370	879 ↓109	564 ↑563	1 ↓1	1,444 ↑453	353 ↓60
70–74	196 ↓41	101 ↑101	950 ↑114	1,247 ↑174	11,901 ↓224	488 ↓147	4 ↑4	1 ↑1	493 ↓142	162 ↓64
75–79	80 ↓3	3 ↑3	126 ↑67	209 ↑67	6,552 ↑2,034	199 ↑25	0 0	0 0	199 ↑25	68 ↑15
80–84	0 0	0 0	0 0	0 0	2,676 ↑193	0 0	0 0	0 0	0 0	0 0
>=85	0 0	0 0	0 0	0 0	3,408 ↑5	0 0	0 0	0 0	0 0	0 0
TOTAL	614 ↓79	912 ↑911	2,348 ↑220	3,874 ↑1,052	38,365 ↑5,378	1,566 ↓231	568 ↑567	2 0	2,136 ↑336	583 ↓109

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Note: Acreage estimations do not include areas covered by water. Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

The number of acres affected by off-installation noise levels greater than 65 dB DNL would decrease from 693 under the No Action Alternative to 614 under Alternative 2A near Eglin Main Base. Near Duke Field, the number of acres affected by off-installation noise levels greater than 65 dB would increase from 1 to 912 acres relative to the No Action Alternative. Areas north of Eglin Main Base, such as Valparaiso, would be exposed to noise generated by JSF aircraft operating at Duke Field. JSF noise would contribute to time-average noise levels in the vicinity of Eglin Main Base, as shown in Figure 4-11, despite the fact that no JSF operations would be conducted at Eglin Main Base under this Alternative. At Choctaw Field, land area exposed to noise greater than 65 dB DNL would increase from 2,128 to 2,348 acres. The number of off-installation residents affected by noise levels between 65 and 75 dB DNL would decrease from 1,623 to 1,367 near Eglin AFB relative to the No Action Alternative. The number affected by noise exceeding 75 dB DNL would increase from 174 to 199 relative to the No Action Alternative. The number of off-installation residents near Duke Field impacted by 65 to 75 dB DNL would increase from 1 to 568.

Potential Hearing Loss (PHL)

Under Alternative 2A, 29 on-installation buildings would be affected by noise greater than 80 dB DNL on Eglin Main Base. On Duke Field, 87 buildings would be impacted. On Choctaw Field, seven buildings would be affected. None of the affected on-base buildings include residential housing. The number of on-base personnel at risk for PHL will be analyzed in a separate study, as discussed under Alternative 1A.

Figure 4-14 shows areas in which persons could potentially be at risk for PHL. Under Alternative 2A, no persons residing off-installation could be exposed to noise levels 80 dB DNL or greater. This is a result of no JSF operations at Eglin Main Base under Alternative 2A.

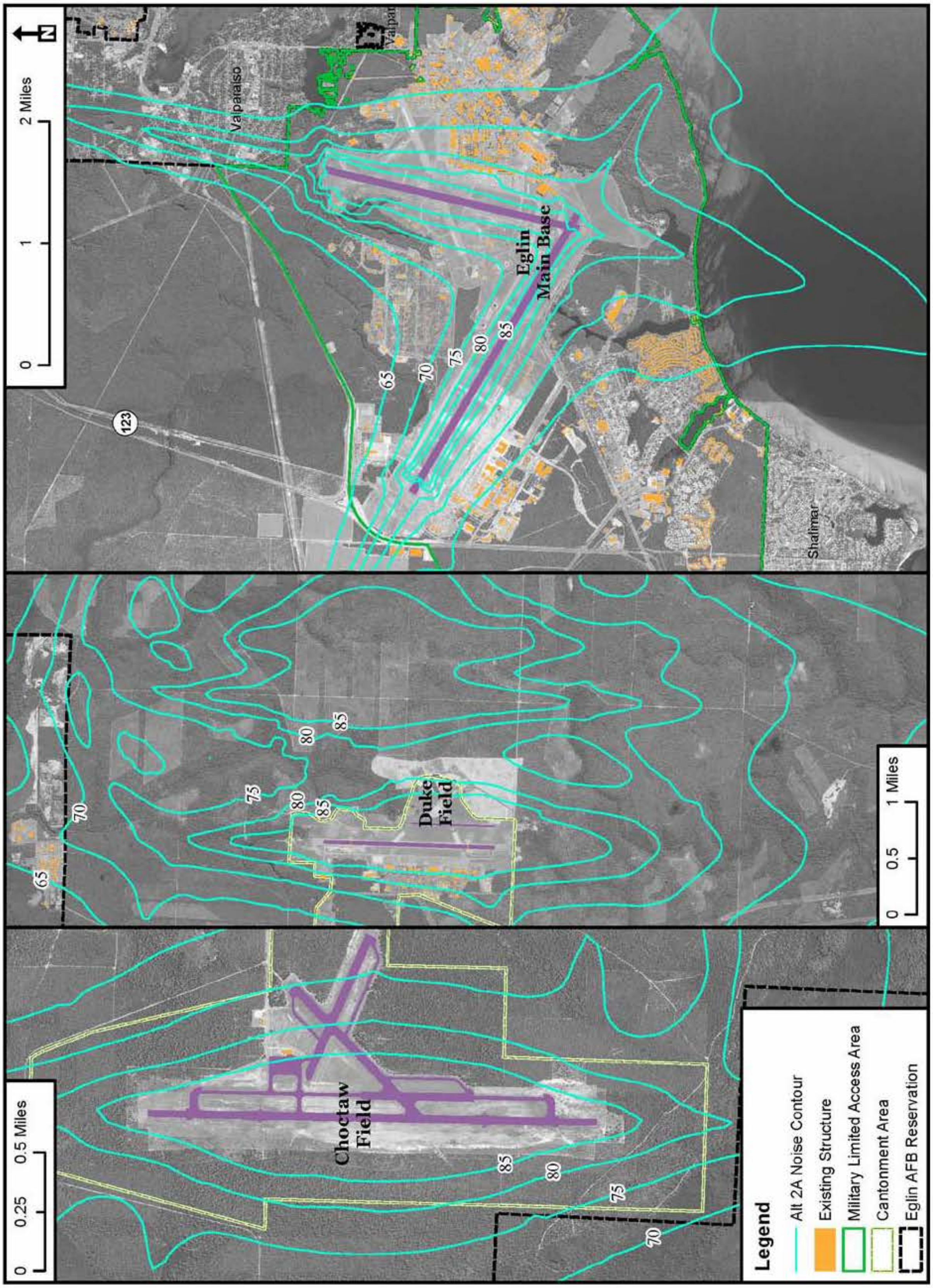


Figure 4-14. Potential Hearing Loss Risk Areas Under Alternative 2A from F-35 and All Other Aircraft

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Aircraft noise levels at several noise-sensitive locations under the No Action Alternative and Alternative 2A are listed in Table 4-14. Noise levels are expressed as the overall DNL at the site and the range of individual overflight noise levels (SEL metric) of the 20 types of flights that contribute most to the overall DNL noise level. Individual overflights may exceed the maximum SEL value of the range stated in Table 4-14, but such overflights would be relatively rare occurrences. Additional details regarding the types of flights contributing most to overall noise levels can be found in the Appendix E table, entitled "Top Contributor Flight Profiles to Overall Time-Averaged Noise Levels at Representative Noise-Sensitive Locations Under Alternative 2A." A map showing these representative noise-sensitive locations can be found in Chapter 3 (Figure 3-6).

Table 4-14. Representative Noise-Sensitive Receptors Under Alternative 2A[1]

Location ID	General Description	No Action		Alternative 2A	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP01	Eglin Housing (Capehart)	70	108	66	89–108
SP02	Eglin Housing (Ben's Lake)	70	108	62	85–103
SP03	Chapel 2 - building 2574	70	111	61	83–101
SP04	Cherokee Elementary School	70	110	62	83–102
SP05	Child Development Center	72	112	65	88–104
SP06	Oakhill School (closed in 2009)	77	117	68	88–109
SP07	Eglin Hospital	64	107	57	81–100
SP08	Eglin VAQ and Dorms	69	106	67	86–106
SP09	Eglin Chapel 1	66	102	63	80–102
SP10	Joint Strike Fighter Academic Training Facility	76	115	66	96–109
SP11	Lewis Middle School	62	99	60	77–99
SP12	Okaloosa STEMM Center (Valparaiso)[3]	65	111	65	83–111
SP13	First Assembly of God (Valparaiso)	68	115	68	85–115
SP14	New Hope Baptist (Valparaiso)	68	115	68	89–115
SP15	Sovereign Grace Church (Valparaiso)	63	107	62	81–107
SP16	First Baptist Church (Valparaiso)	62	105	61	79–105
SP17	Unitarian Church (Valparaiso)	58	100	57	75–100
SP18	#1 Housing (Valparaiso)	68	114	67	89–119
SP19	#2 Housing (Valparaiso)	71	119	71	89–119
SP20	Edge Elementary School	58	105	58	81–108
SP21	Twin Cities Medical Center	60	108	60	81–108
SP22	Niceville Community Church	74	123	74	85–123
SP23	Private School (Niceville)	78	126	78	87–126
SP24	Private School (Fort Walton)	55	99	54	75–99
SP25	Okaloosa Walton College	53	95	52	72-95
SP26	Kenwood Elementary	54	97	53	75–97
SP27	Pryor Middle School	53	95	52	73-95

Table 4-14. Noise-Sensitive Receptors Under Alternative 2A[1], Cont'd

Location ID	General Description	No Action		Alternative 2A	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP28	Housing (Fort Walton Beach)	55	99	54	75–99
SP29	Residential property south of Hwy 90 in Crestview	49	92	58	80–98
SP30	Shalimar Elementary School	58	103	52	73–93
SP31	Shalimar Residential	60	103	55	75–94
SP32	Residential Poquito Bayou West Side	58	100	52	73–94
SP33	University of Florida Research and Engineering Education Facility	63	110	56	78–102
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	70	107	67	87–107
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	74	112	72	92–112
SP36	Eglin Law Center (building 2)	75	113	73	97–113
SP37	Saint Sylvester Catholic Church, Gulf Breeze	<45	75	<45	51–92
SP38	Residential, north of Choctaw	<45	77	<45	54–77
SP39	Residential, south of Choctaw	48	84	49	62–84
SP40	Okaloosa County Prison	60	109	65	90–109

dB = decibels; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools, hospitals, and churches presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.
2. Top 20 SEL refers to the range of SEL decibel noise levels generated by the 20 profiles that contribute most to overall DNL noise level at that location. Refer to Appendix E, *Noise*, for tables that describe the top 20 profiles.
3. Previously Valparaiso Elementary School.

Note: Calculated military noise below the DNL ambient sound level of 45 dB is listed as <45 dB.

Under Alternative 2A, DNL noise levels at noise-sensitive locations near Eglin Main Base would remain the same or decrease relative to the No Action Alternative. DNL noise levels at locations near Duke Field and Choctaw Field would remain the same or decrease relative to the No Action Alternative with the exception of a residential property south of Crestview (location SP29 in Table 4-4), at which the noise level would increase by 9 dB from 49 to 58 dB DNL. Noise level increases of 1 dB would not be expected to be noticeable while an increase of 9 dB would typically be considered much louder. The range of single overflight events noise levels to which the points studied would be exposed under Alternative 2A would be similar to the No Action Alternative.

Equivalent Sound Level (L_{eq}) at Representative Local Schools

Table 4-15 lists the hourly L_{eq} under the No Action Alternative during a typical school day (7:00 AM – 4:00 PM, Monday–Friday) at several schools located near Eglin Main Base. The minimum and maximum hourly L_{eq} values provide the expected range of noise levels to which the schools could be exposed on a typical day. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI standard for at least a portion of one hour during a typical school day. The Appendix E table, entitled "Hourly L_{eq} Noise Levels During the School Day at Representative Schools

Near Elgin Main Under Alternative 2A," lists hourly L_{eq} for each hour of the school day, giving some indication as to which hours of the day might be more disruptive of learning.

Table 4-15. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2A[1]

Location ID	General Description	Minimum Indoor Hourly L_{eq}[2]	Maximum Indoor Hourly L_{eq}[2]
SP04	Cherokee Elementary School	<=40	<=40
SP05	Child Development Center	<=40	42
SP06	Oakhill School (closed in 2009)	<=40	45
SP11	Lewis Middle School	<=40	<=40
SP12	Okaloosa STEMM Center (Valparaiso)[3]	<=40	43
SP20	Edge Elementary School	<=40	<=40
SP23	Private School (Niceville)	47	56
SP24	Private School (Fort Walton)	<=40	<=40
SP26	Kenwood Elementary	<=40	<=40
SP27	Pryor Middle School	<=40	<=40
SP30	Shalimar Elementary School	<=40	<=40

L_{eq} = equivalent sound level; ID = identification code; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools presented in this table are provided to help understand the noise environment. As such, this table may not include all schools that are affected by noise contours.
2. Indoor L_{eq} is assumed to be 25 decibels less than outdoor L_{eq} due to the noise level reduction provided by the structure with windows closed. Actual outdoor-to-indoor noise level reduction varies from school to school and between locations within individual schools.
3. Previously Valparaiso Elementary School.

Note: Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <=40 dB.

The locations of the assessed schools are shown in Figure 3-6. Under Alternative 2A, one active school, an educational center, and a daycare would exceed the recommended noise guidelines. Oakhill School closed in 2009 due to factors not related to noise.

Number of Noise Events Analysis

Table 4-16 provides a list of locations and the number of times during a day that one might experience disruption of communications or activities based on the possible number of noise events exceeding an L_{max} of 50 dB from all flight operations (including non-JSF operations) under the No Action Alternative and under Alternative 2A. For example, an individual living in Eglin's Capehart housing (SP01) would typically experience as many as 159 disruptive events per day under the No Action Alternative, while under Alternative 2A the resident could experience as many as 58 disruptive events each day.

Table 4-16. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2A

Location ID	Location of Interest	No Action Alternative	Alternative 2A
SP01	Eglin Housing (Capehart)	159	58
SP02	Eglin Housing (Ben's Lake)	157	51
SP03	Chapel 2 - building 2574	151	39
SP04	Cherokee Elementary School	156	43
SP05	Child Development Center	155	54
SP06	Oakhill School (closed in 2009)	162	54
SP07	Eglin Hospital	119	24
SP08	Eglin VAQ and Dorms	135	43
SP09	Eglin Chapel 1	127	39
SP10	Joint Strike Fighter Academic Training Facility	168	35
SP11	Lewis Middle School	109	30
SP12	Okaloosa STEMM Center (Valparaiso)	121	56
SP13	First Assembly of God (Valparaiso)	133	66
SP14	New Hope Baptist (Valparaiso)	124	64
SP15	Sovereign Grace Church (Valparaiso)	114	42
SP16	First Baptist Church (Valparaiso)	109	37
SP17	Unitarian Church (Valparaiso)	36	24
SP18	#1 Housing (Valparaiso)	134	63
SP19	#2 Housing (Valparaiso)	90	98
SP20	Edge Elementary School	18	45
SP21	Twin Cities Medical Center	22	50
SP22	Niceville Community Church	113	124
SP23	Private School (Niceville)	121	130
SP24	Private School (Fort Walton)	20	11
SP25	Okaloosa Walton College	10	6
SP26	Kenwood Elementary	16	8
SP27	Pryor Middle School	12	8
SP28	Housing (Fort Walton Beach)	19	11
SP29	Residential property south of Hwy 90 in Crestview	7	52
SP30	Shalimar Elementary School	23	8
SP31	Shalimar Residential	40	16
SP32	Residential Poquito Bayou West Side	26	10
SP33	University of Florida Research and Engineering Education Facility	73	16
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	137	43
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	163	59
SP36	Eglin Law Center (building 2)	168	63
SP37	Saint Sylvester Catholic Church, Gulf Breeze	0	1
SP38	Residential, north of Choctaw	0	0
SP39	Residential, south of Choctaw	1	2
SP40	Okaloosa County Prison	41	63

< = less than; dB = decibels; DNL = day-night average sound level; HQ = Headquarters; Hwy = Florida Highway; L_{max} = maximum sound level; ID = identification code; STEMM = Science, Technology, Engineering, Mathematics, and Medical

4.3.3.2 *Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin Runway 12*

Flight Operations

Day-Night Average Sound Level (DNL)

Under Alternative 2B, the expected frequency of afterburner departures and aircraft operations between 10:00 PM and 7:00 AM would be as shown in Table 4-17. Afterburner departures generate more noise than non-afterburner departures, and flights during the "late night" time period between 10:00 PM and 7:00 AM would be more likely to disturb sleep or other activities that require a quiet environment.

Table 4-17. Afterburner Departures and "Late Night" Flying Operations (10:00 PM - 7:00 AM) Under Alternative 2B

Operation	Eglin Main Base		Duke Field		Choctaw Field	
	% Afterburner	% Late Night	% Afterburner	% Late Night	% Afterburner	% Late Night
Departures	0%	1%	59%	0%	n/a	n/a
Arrivals	n/a	1%	n/a	3%	n/a	n/a
Closed Patterns	n/a	1%	n/a	3%	n/a	n/a

n/a = not applicable
Note: The numbers listed in the table represent the percentage of total operations at each airfield.

Noise contours under Alternative 2B are depicted in Figure 4-15. Noise levels in the vicinity of Duke Field under Alternative 2B are depicted in Figure 4-16. Noise levels in the vicinity of Duke Field under Alternative 2B and the No Action Alternative are depicted in Figure 4-17. Table 4-18 lists the on-base acreage, off-base acreage, estimated off-base population, and residential parcels impacted by various noise levels in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field under Alternative 2B.

Impacts associated with implementing Alternative 2B would be similar in type (e.g., annoyance, activity interference, possible health impacts) to impacts described for Alternative 1A but would differ in the acreage and population impacted.

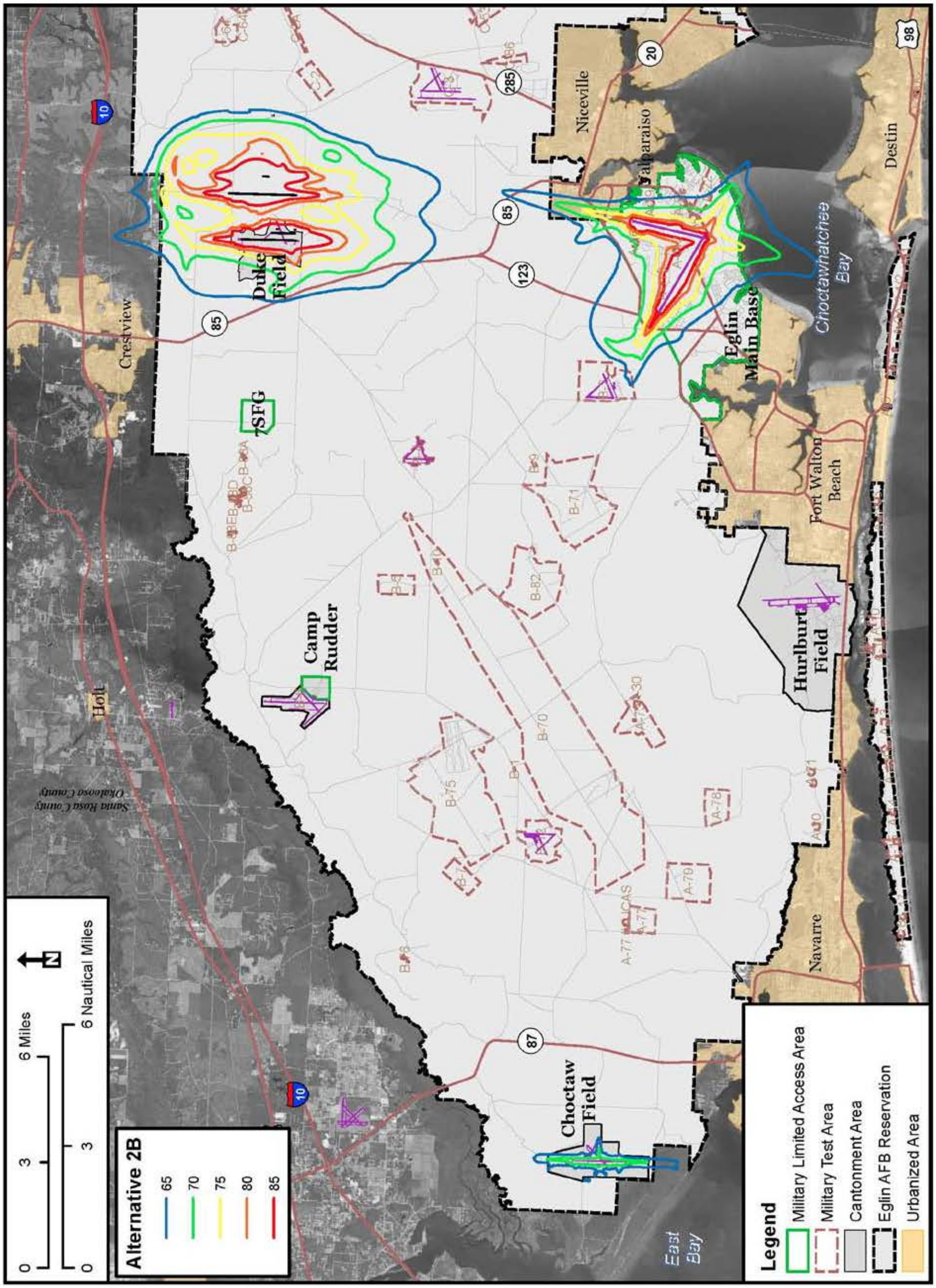


Figure 4-15. Noise Contours from F-35 and All Other Aircraft Under Alternative 2B in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field

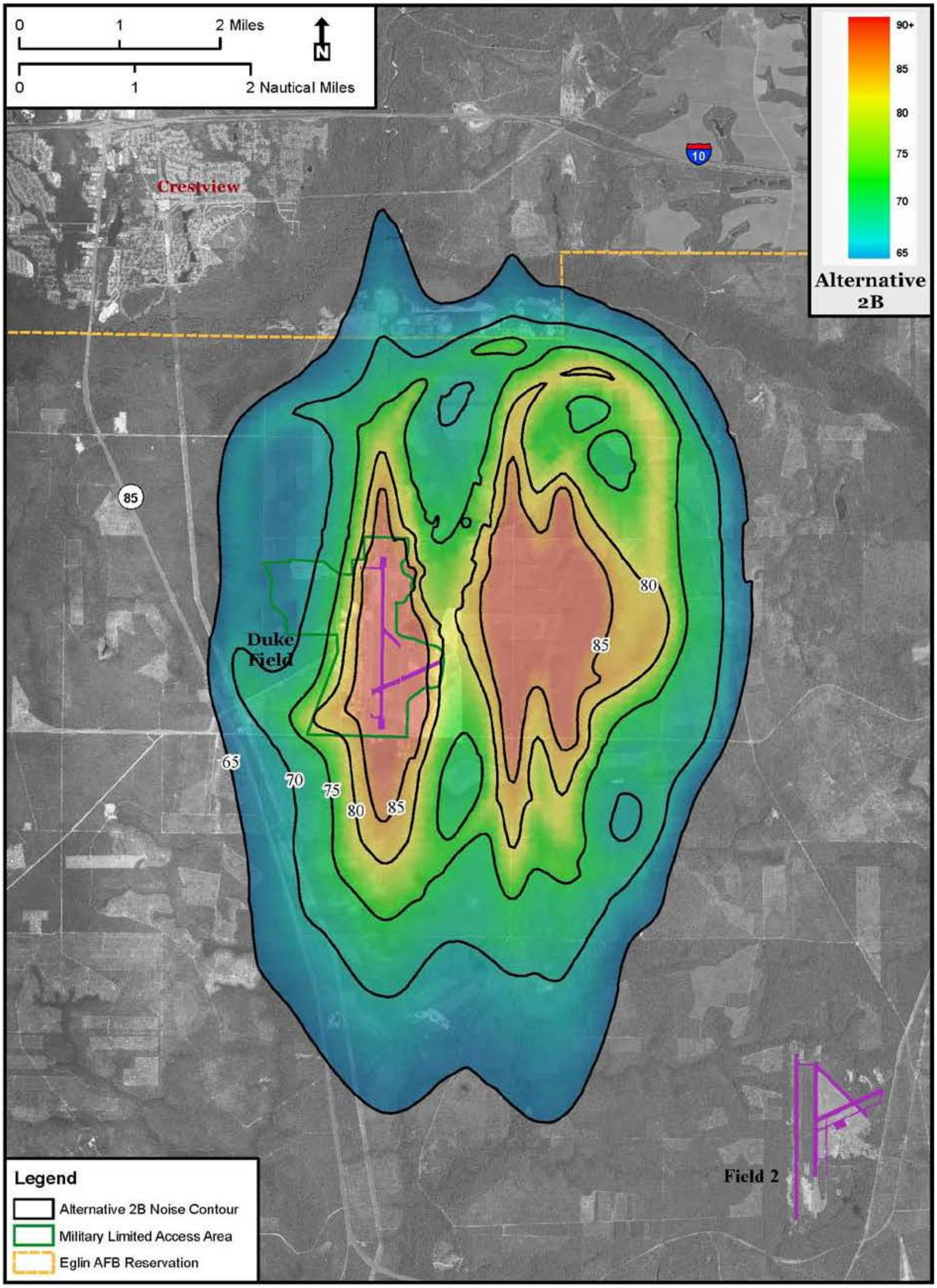


Figure 4-16. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2B

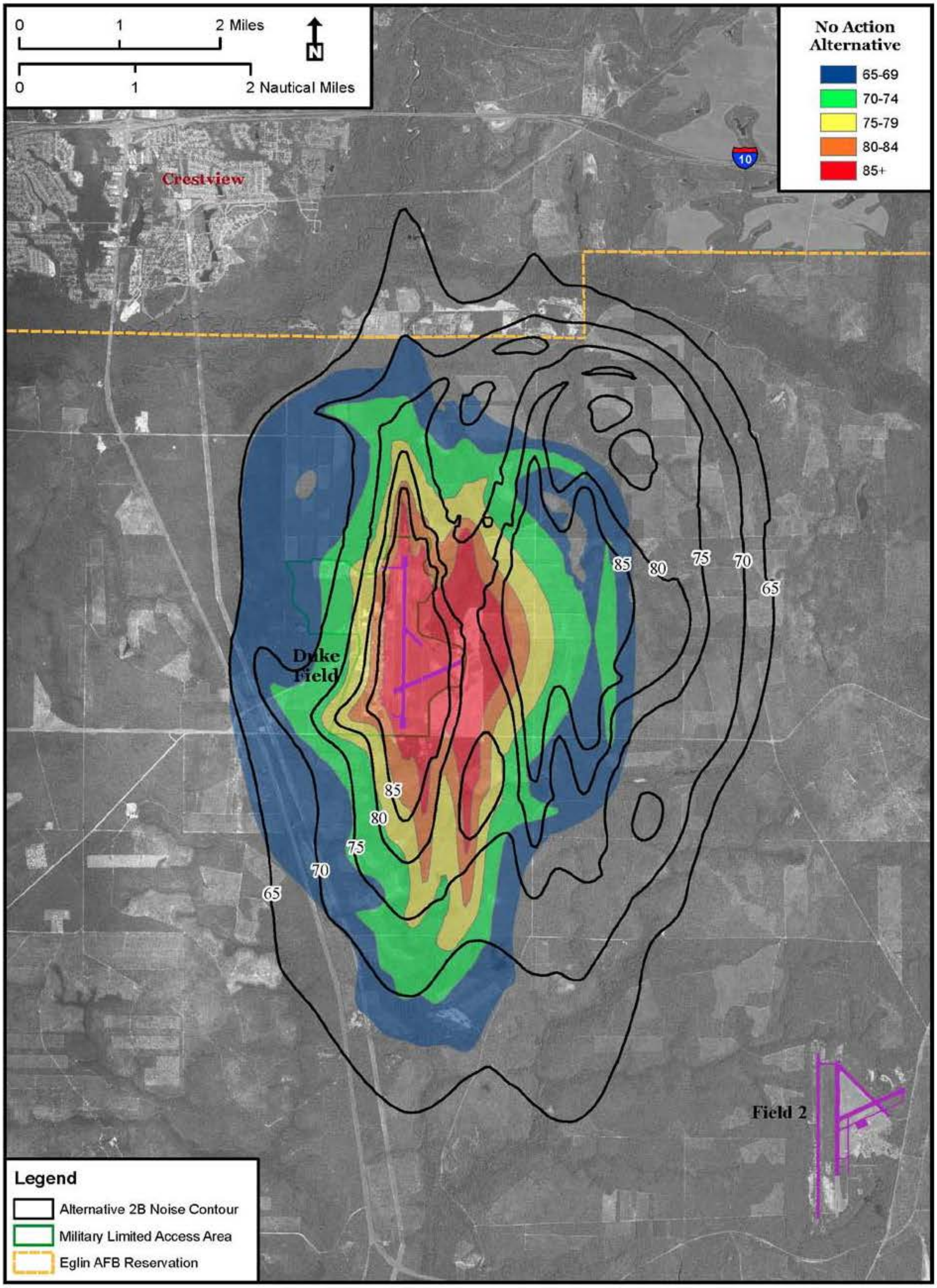


Figure 4-17. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2B and the No Action Alternative

Table 4-18. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2B

Noise Level (dB DNL)	Acres OFF-Installation by Airfield: EGLIN	Acres OFF-Installation by Airfield: DUKE	Acres OFF-Installation by Airfield: CHOCTAW	TOTAL Acres OFF-Installation	TOTAL Acres ON-Installation	Population OFF-Installation by Airfield: EGLIN	Population OFF-Installation by Airfield: DUKE	Population OFF-Installation by Airfield: CHOCTAW	TOTAL Population OFF-Installation	Total Residential Parcels
65–69	397 (↑24)	792 (↑791)	89 (↓1,144)	1,278 (↓329)	13,565 (↑3,107)	1,016 (↑28)	567 (↑566)	0 (↓2)	1,583 (↑592)	463 (↑50)
70–74	239 (↑2)	95 (↑95)	0 (↓836)	334 (↓739)	8,977 (↓3,148)	664 (↑29)	0 (– 0)	0 (– 0)	664 (↑29)	247 (↑21)
75–79	89 (↑6)	0 (– 0)	0 (↓59)	89 (↓53)	5,820 (↑1,302)	216 (↑42)	0 (– 0)	0 (– 0)	216 (↑42)	76 (↑23)
80–84	8 (↑8)	0 (– 0)	0 (– 0)	8 (↑8)	2,853 (↑370)	19 (↑19)	0 (– 0)	0 (– 0)	19 (↑19)	0 (– 0)
>=85	0 (– 0)	0 (– 0)	0 (– 0)	0 (– 0)	3,685 (↑282)	0 (– 0)	0 (– 0)	0 (– 0)	0 (– 0)	0 (– 0)
TOTAL	**733** (↑40)	**887** (↑886)	**89** (↓2,039)	**1,709** (↓1,113)	**34,900** (↑1,913)	**1,915** (↑118)	**567** (↑566)	**0** (↓2)	**2,482** (↑682)	786 (↑94)

↑ ↓ – Amount of increase/decrease/no change from No Action Alternative

Note: Acreage estimations do not include areas covered by water. Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

The number of acres affected by off-installation noise levels greater than 65 dB DNL would increase from 693 under the No Action Alternative to 733 under Alternative 2B near Eglin Main Base. Near Duke Field, the number of acres affected by off-installation noise levels greater than 65 dB would increase from 1 to 887 acres relative to the No Action Alternative. Acreage affected by noise greater than 65 dB DNL would decrease from 2,128 to 89 acres near Choctaw Field. The number of off-installation residents affected by noise levels between 65 and 75 dB DNL would increase from 1,623 to 1,680 near Eglin AFB relative to the No Action Alternative. The number of off-installation residents affected by noise exceeding 75 dB DNL would increase from 174 to 235 relative to the No Action Alternative. The number of off-installation residents near Duke Field impacted by 65 to 75 dB DNL would increase from 1 to 567.

Potential Hearing Loss (PHL)

Table 4-19 presents the results of the PHL assessment, and Figure 4-18 shows areas in which persons could potentially be at risk for PHL.

Under Alternative 2B, 109 on-installation buildings would be impacted by noise greater than 80 dB DNL on Eglin Main Base. On Duke Field, 93 buildings would be affected. None of the affected on-base buildings include residential housing. The number of on-base personnel at risk for PHL will be analyzed in a separate study, as discussed under Alternative 1A.

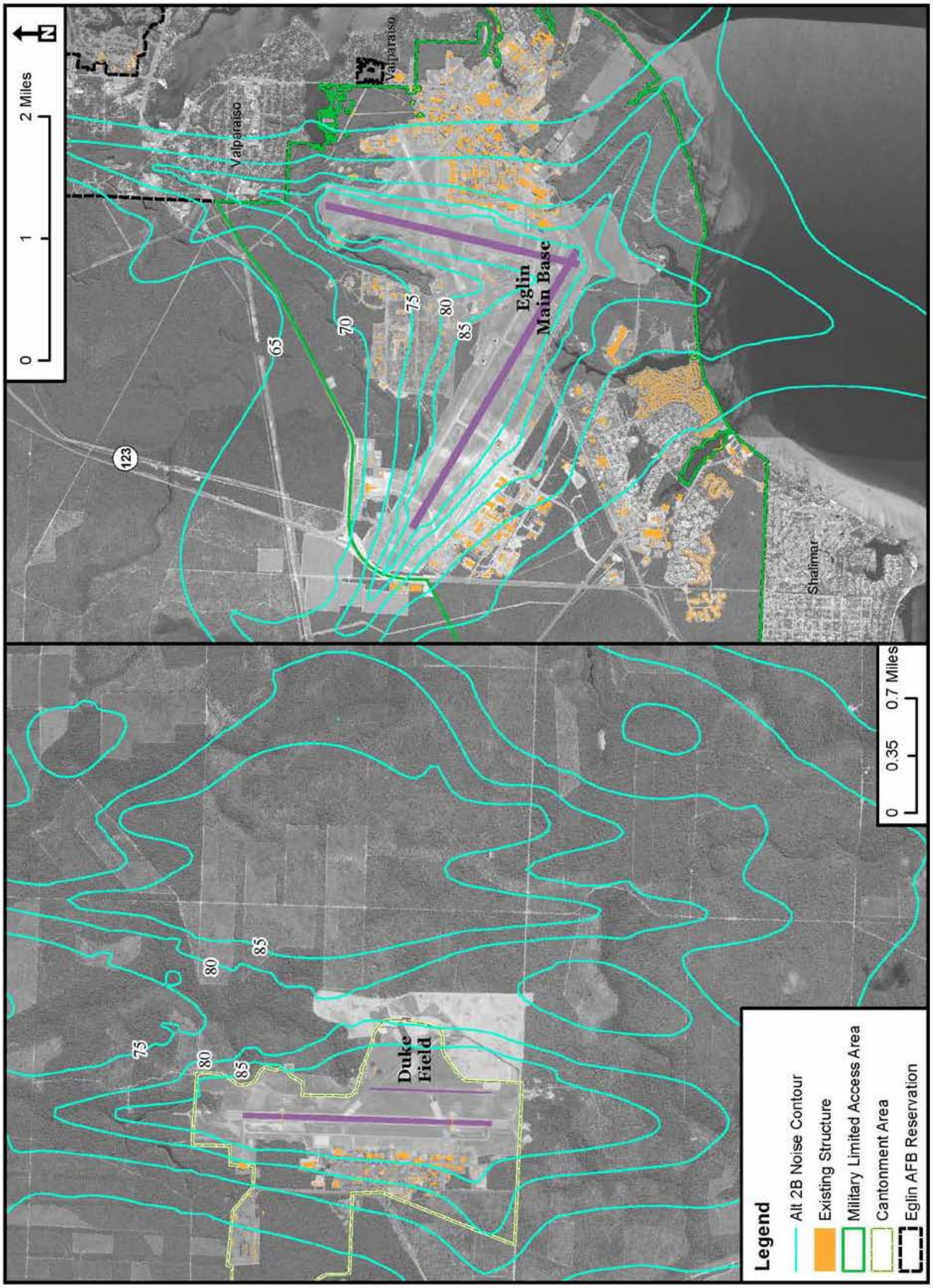


Figure 4-18. Potential Hearing Loss Risk Areas Under Alternative 2B from F-35 and All Other Aircraft

It is estimated that a total of 19 individuals in the vicinity of Eglin AFB may be exposed to aircraft noise 80 dB DNL or greater (Table 4-19). These individuals could experience as much as a 3.0 dB Average NIPTS in their hearing were they to remain in that location and under those same conditions for 40 years. Likewise, the most sensitive 10 percent of the 15 individuals are expected to experience no more degradation to their hearing than an Average NIPTS hearing loss of 7.0 dB.

Table 4-19. Off-Installation Population Exposed to Noise Levels that Could Result in NIPTS Under Alternative 2B

Contour Band (dB DNL)	Estimated Population
80–81	19
81–82	0
82–83	0
83–84	0
84–85	0
85–86	0
86–87	0
87–88	0
88–89	0
89–90	0
Total	**19**

dB = decibels; DNL = day-night average sound level; NIPTS = Noise-Induced Permanent Threshold Shift

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Aircraft noise levels at several noise-sensitive locations under the No Action Alternative and Alternative 2B are listed in Table 4-20. Noise levels are expressed as the overall DNL at the site and the range of individual overflight noise levels (SEL metric) of the 20 types of flights that contribute most to the overall DNL noise level. Individual overflights may exceed the maximum SEL value of the range stated in Table 4-20, but such overflights would be relatively rare occurrences. Additional details regarding the types of flights contributing most to overall noise levels can be found in the Appendix E table, entitled "Top Contributor Flight Profiles to Overall Time-Averaged Noise Levels at Representative Noise-Sensitive Locations Under Alternative 2B." A map showing these representative noise-sensitive locations can be found in Chapter 3 (Figure 3-6).

Table 4-20. Representative Noise-Sensitive Receptors Under Alternative 2B[1]

Location ID	General Description	No Action		Alternative 2B	
		DNL (dB)	Max SEL dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP01	Eglin Housing (Capehart)	70	108	68	89–108
SP02	Eglin Housing (Ben's Lake)	70	108	67	92–108
SP03	Chapel 2 – building 2574	70	111	67	94–111
SP04	Cherokee Elementary School	70	110	68	93–110
SP05	Child Development Center	72	112	69	90–110

Table 4-20. Representative Noise-Sensitive Receptors Under Alternative 2B[1], Cont'd

Location ID	General Description	No Action		Alternative 2B	
		DNL (dB)	Max SEL dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP06	Oakhill School (closed in 2009)	77	117	73	101–117
SP07	Eglin Hospital	64	107	61	88–102
SP08	Eglin VAQ and Dorms	69	106	68	91–106
SP09	Eglin Chapel 1	66	102	65	87–102
SP10	Joint Strike Fighter Academic Training Facility	76	115	74	101–115
SP11	Lewis Middle School	62	99	61	84–99
SP12	Okaloosa STEMM Center (Valparaiso)[3]	65	111	66	83–111
SP13	First Assembly of God (Valparaiso)	68	115	69	89–115
SP14	New Hope Baptist (Valparaiso)	68	115	69	89–115
SP15	Sovereign Grace Church (Valparaiso)	63	107	64	81–107
SP16	First Baptist Church (Valparaiso)	62	105	62	83–105
SP17	Unitarian Church (Valparaiso)	58	100	59	79–100
SP18	#1 Housing (Valparaiso)	68	114	69	87–114
SP19	#2 Housing (Valparaiso)	71	119	72	89–120
SP20	Edge Elementary School	58	105	59	82–105
SP21	Twin Cities Medical Center	60	108	61	83–108
SP22	Niceville Community Church	74	123	74	85–123
SP23	Private School (Niceville)	78	126	78	96–126
SP24	Private School (Fort Walton)	55	99	54	75–99
SP25	Okaloosa Walton College	53	95	52	72–95
SP26	Kenwood Elementary	54	97	53	75–97
SP27	Pryor Middle School	53	95	52	73–95
SP28	Housing (Fort Walton Beach)	55	99	54	77–99
SP29	Residential property south of Hwy 90 in Crestview	49	92	57	80–98
SP30	Shalimar Elementary School	58	103	53	75–93
SP31	Shalimar Residential	60	103	56	75–94
SP32	Residential Poquito Bayou West Side	58	100	53	75–94
SP33	University of Florida Research and Engineering Education Facility	63	110	59	84–102
SP34	Eglin AFB building 1 (Air Armament Center HQ)	70	107	68	91–107
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	74	112	73	96–112
SP36	Eglin Law Center (Bldg 2)	75	113	74	97–113
SP37	Saint Sylvester Catholic Church, Gulf Breeze	<45	75	<45	39–75
SP38	Residential, north of Choctaw	<45	77	<45[1]	45–76
SP39	Residential, south of Choctaw	48	84	<45	33–75
SP40	Okaloosa County Prison	60	109	65	88–107

dB = decibels; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools, hospitals, and churches presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.
2. Top 20 SEL refers to the range of SEL decibel noise levels generated by the 20 profiles that contribute most to overall DNL noise level at that location. Refer to Appendix E, *Noise*, for tables that describe the top 20 profiles.
3. Previously Valparaiso Elementary School.

Note: Calculated military noise below the DNL ambient sound level of 45 dB is listed as <45 dB.

Under Alternative 2B, DNL noise levels at some noise-sensitive locations near Eglin Main Base would increase by up to 1 dB, while other locations near Eglin Main Base would remain the same or decrease slightly. DNL noise levels at locations near Duke Field and Choctaw Field would remain the same or decrease relative to the No Action Alternative, with the exception of a residential property south of Crestview (SP 29), at which the noise level would increase by 8 dB from 49 to 57 dB DNL. The range of noise levels generated by the 20 types of single overflight events contributing most to overall DNL noise levels would be similar to the range of overflight noise levels under the No Action Alternative.

Equivalent Sound Level (L_{eq}) at Representative Local Schools

Table 4-21 lists the hourly L_{eq} under Alternative 2B during a typical school day (7:00 AM – 4:00 PM, Monday–Friday) at several schools located near Eglin Main Base. The minimum and maximum hourly L_{eq} values provide the expected range of noise levels to which the schools could be exposed on a typical day. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI standard for at least a portion of one hour during a typical school day. The Appendix E table, entitled "Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2B," lists hourly L_{eq} for each hour of the school day, giving some indication as to which hours of the day might be more disruptive of learning.

Table 4-21. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2B[1]

Location ID	General Description	Minimum Indoor Hourly L_{eq}[2]	Maximum Indoor Hourly L_{eq}[2]
SP04	Cherokee Elementary School	<=40	46
SP05	Child Development Center	<=40	47
SP06	Oakhill School (closed in 2009)	43	51
SP11	Lewis Middle School	<=40	<=40
SP12	Okaloosa STEMM Center (Valparaiso)[3]	<=40	44
SP20	Edge Elementary School	<=40	<=40
SP23	Private School (Niceville)	47	56
SP24	Private School (Fort Walton)	<=40	<=40
SP26	Kenwood Elementary	<=40	<=40
SP27	Pryor Middle School	<=40	<=40
SP30	Shalimar Elementary School	<=40	<=40

< = less than; ID = identification code; L_{eq} = equivalent sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools presented in this table are provided to help understand the noise environment. As such, this table may not include all schools that are affected by noise contours.
2. Indoor L_{eq} is assumed to be 25 decibels less than outdoor L_{eq} due to the noise level reduction provided by the structure with windows closed. Actual outdoor-to-indoor noise level reduction varies from school to school and between locations within individual schools.
3. Previously Valparaiso Elementary School.

Note: Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <=40 dB.

The locations of the assessed schools are shown in Figure 3-6. Under Alternative 2B, two active schools, an educational center, and a daycare would exceed the recommended noise guidelines. Oakhill School closed in 2009 due to factors not related to noise.

Number of Noise Events Analysis

Table 4-22 provides a list of locations and the number of times during a day that one might experience disruption of communications or activities based on the possible number of noise events exceeding an L_{max} of 50 dB from all flight operations (including non-JSF operations) under the No Action Alternative and under Alternative 2B. For example, an individual living in Eglin's Capehart housing (SP01) would typically experience as many as 159 disruptive events per day under the No Action Alternative, while under Alternative 2B the resident could experience as many as 94 disruptive events each day.

Table 4-22. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2B

Location ID	Location of Interest	No Action Alternative	Alternative 2B
SP01	Eglin Housing (Capehart)	159	94
SP02	Eglin Housing (Ben's Lake)	157	85
SP03	Chapel 2 - building 2574	151	74
SP04	Cherokee Elementary School	156	78
SP05	Child Development Center	155	90
SP06	Oakhill School (closed in 2009)	162	91
SP07	Eglin Hospital	119	53
SP08	Eglin VAQ and Dorms	135	76
SP09	Eglin Chapel 1	127	71
SP10	Joint Strike Fighter Academic Training Facility	168	74
SP11	Lewis Middle School	109	61
SP12	Okaloosa STEMM Center (Valparaiso)	121	72
SP13	First Assembly of God (Valparaiso)	133	83
SP14	New Hope Baptist (Valparaiso)	124	80
SP15	Sovereign Grace Church (Valparaiso)	114	58
SP16	First Baptist Church (Valparaiso)	109	53
SP17	Unitarian Church (Valparaiso)	36	36
SP18	#1 Housing (Valparaiso)	134	85
SP19	#2 Housing (Valparaiso)	90	114
SP20	Edge Elementary School	18	55
SP21	Twin Cities Medical Center	22	59
SP22	Niceville Community Church	113	139
SP23	Private School (Niceville)	121	146
SP24	Private School (Fort Walton)	20	11
SP25	Okaloosa Walton College	10	6
SP26	Kenwood Elementary	16	8
SP27	Pryor Middle School	12	8
SP28	Housing (Fort Walton Beach)	19	11
SP29	Residential property south of Hwy 90 in Crestview	7	51
SP30	Shalimar Elementary School	23	16
SP31	Shalimar Residential	40	24

Table 4-22. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2B, Cont'd

Location ID	Location of Interest	No Action Alternative	Alternative 2B
SP32	Residential Poquito Bayou West Side	26	18
SP33	University of Florida Research and Engineering Education Facility	73	36
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	137	76
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	163	94
SP36	Eglin Law Center (building 2)	168	99
SP37	Saint Sylvester Catholic Church, Gulf Breeze	0	0
SP38	Residential, north of Choctaw	0	0
SP39	Residential, south of Choctaw	1	0
SP40	Okaloosa County Prison	41	63

< = less than; dB = decibels; DNL = day-night average sound level; HQ = Headquarters; Hwy = Florida Highway; ID = identification code; L_{max} = maximum sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

4.3.3.3 *Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin Runway 12 and Choctaw Field*

Flight Operations

Day-Night Average Sound Level (DNL)

Under Alternative 2C, the expected frequency of afterburner departures and aircraft operations between 10:00 PM and 7:00 AM would be as shown in Table 4-23. Afterburner departures generate more noise than non-afterburner departures, and flights during the "late night" time period between 10:00 PM and 7:00 AM would be more likely to disturb sleep or other activities that require a quiet environment.

Table 4-23. Afterburner Departures and "Late Night" Flying Operations (10:00 PM–7:00 AM) Under Alternative 2C

Operation	Eglin Main Base		Duke Field		Choctaw Field	
	% Afterburner	% Late Night	% Afterburner	% Late Night	% Afterburner	% Late Night
Departures	0%	1%	59%	0%	0%	1%
Arrivals	n/a	1%	n/a	3%	n/a	1%
Closed Patterns	n/a	1%	n/a	2%	n/a	2%

Note: The numbers listed in the table represent the percentage of total operations at each airfield.

Noise contours under Alternative 2C are depicted in Figure 4-19. Noise levels in the vicinity of Duke Field under Alternative 2C are depicted in Figure 4-20. Noise levels in the vicinity of Duke Field under Alternative 2C *and* the No Action Alternative are depicted in Figure 4-21. Table 4-24 lists the on-base acreage, off-base acreage, estimated off-base population, and residential parcels impacted by various noise levels in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field under Alternative 2C.

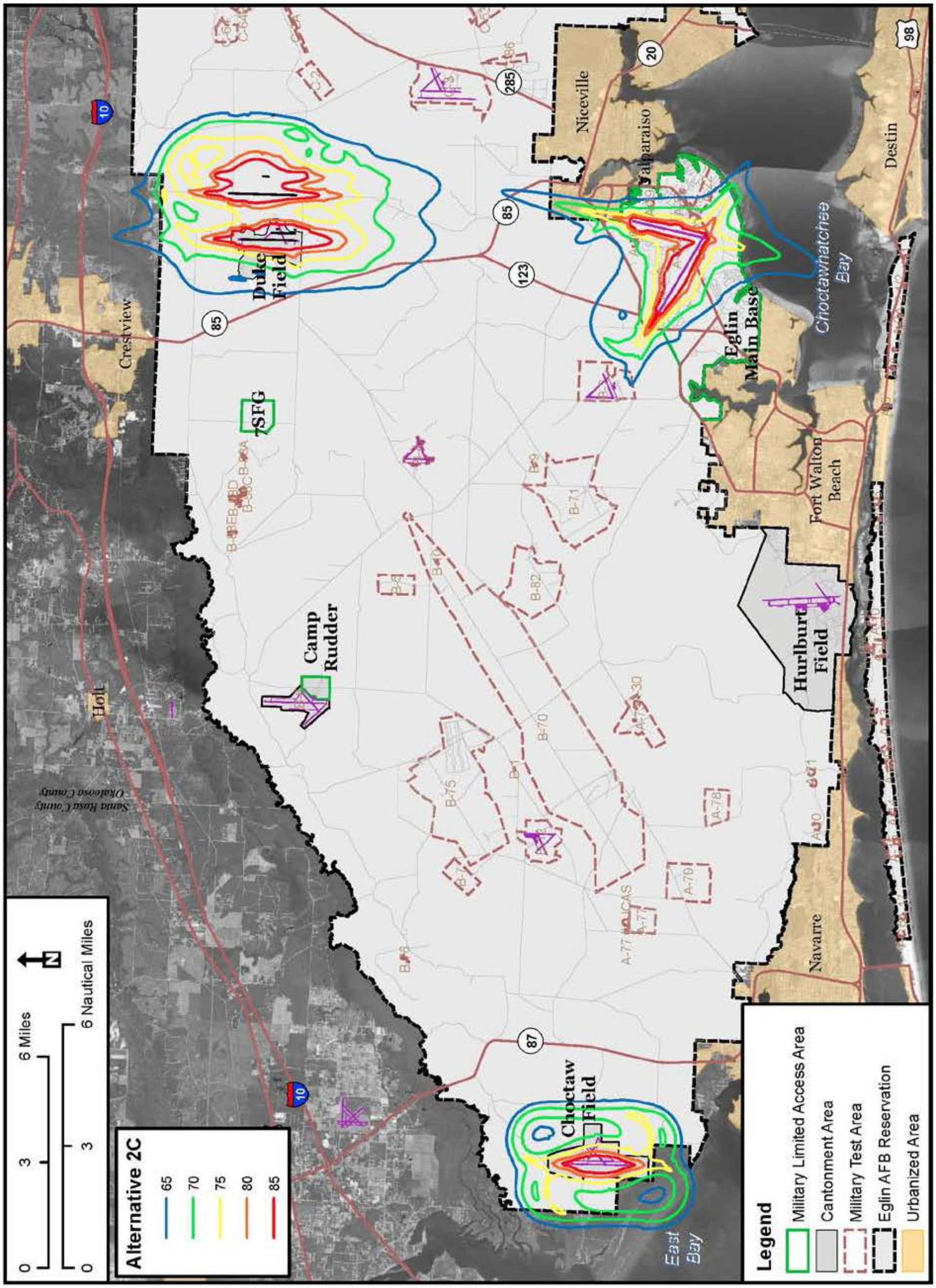


Figure 4-19. Noise Contours from F-35 and All Other Aircraft Under Alternative 2C in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field

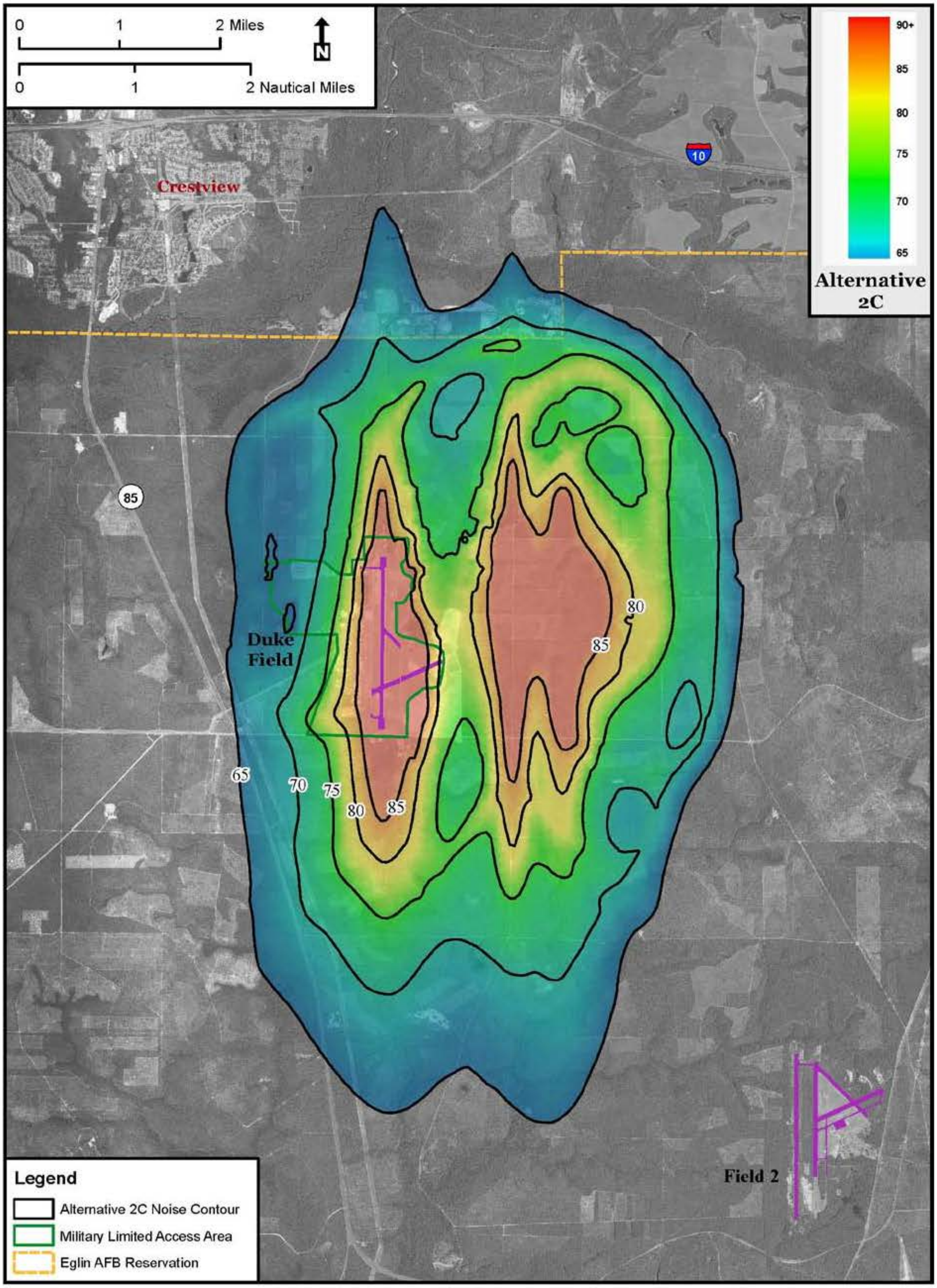


Figure 4-20. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2C

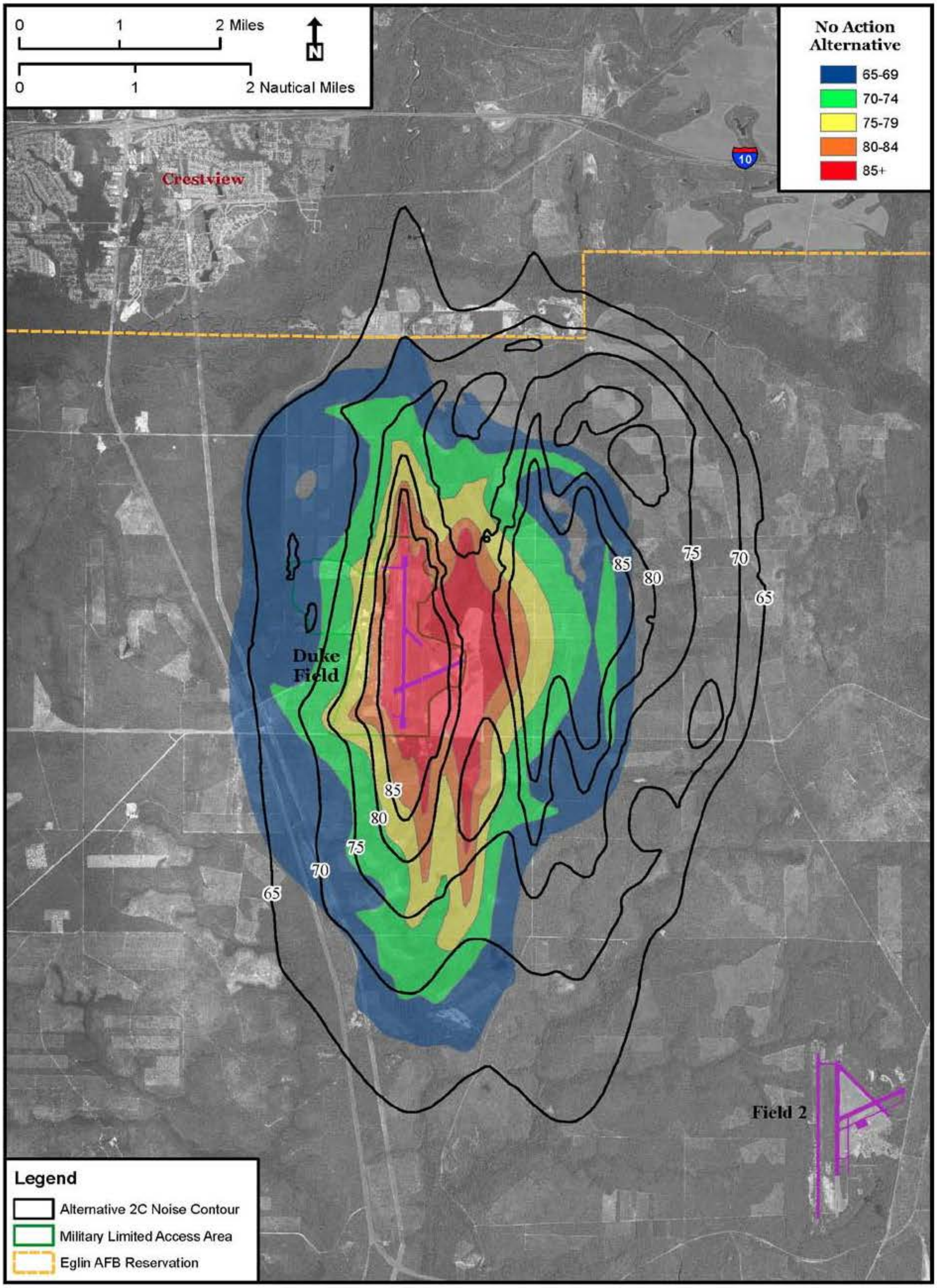


Figure 4-21. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2C and the No Action Alternative

The number of acres affected by off-installation noise greater than 65 dB DNL would increase from 693 under the No Action Alternative to 735 under Alternative 2C near Eglin Main Base. Near Duke Field, the number of acres affected by off-installation noise levels greater than 65 dB would increase from 1 to 827 acres. The area between Eglin Main Base and Duke Field would be impacted by noise from JSF operations at both installations. Acreage affected by noise greater than 65 dB DNL would increase from 2,128 to 2,233 acres near Choctaw Field. The number of off-installation residents affected by noise levels between 65 and 75 dB DNL would increase from 1,623 to 1,688 near Eglin AFB relative to the No Action Alternative. The number affected by noise exceeding 75 dB DNL would increase from 174 to 229 relative to the No Action Alternative. The number of off-installation residents near Duke Field impacted by 65 to 75 dB DNL would increase from 1 to 534.

Table 4-24. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2C

Noise Level (dB DNL)	Acres OFF-Installation by Airfield: EGLIN	DUKE	CHOCTAW	TOTAL Acres OFF-Installation	TOTAL Acres ON-Installation	Population OFF-Installation by Airfield: EGLIN	DUKE	CHOCTAW	TOTAL Population OFF-Installation	Total Residential Parcels
65–69	398 ↑25	754 ↑753	1,347 ↑114	2,499 ↑892	16,024 ↑5,566	1,017 ↑29	534 ↑533	1 ↓1	1,552 ↑561	462 ↑49
70–74	240 ↑3	73 ↑73	830 ↓6	1,143 ↑70	12,293 ↑168	671 ↑36	0 ■0	1 ↑1	672 ↑37	250 ↑24
75–79	89 ↑6	0 ■0	56 ↓3	145 ↑3	6,407 ↑1,889	212 ↑38	0 ■0	0 ■0	212 ↑38	73 ↑20
80–84	8 ↑8	0 ■0	0 ■0	8 ↑8	2,774 ↑291	17 ↑17	0 ■0	0 ■0	17 ↑17	0 ■0
>=85	0 ■0	0 ■0	0 ■0	0 ■0	3,955 ↑552	0 ■0	0 ■0	0 ■0	0 ■0	0 ■0
TOTAL	**735** ↑42	**827** ↑826	**2,233** ↑105	**3,795** ↑973	**41,453** ↑8,466	**1,917** ↑120	**534** ↑533	**2** ■0	**2,453** ↑653	**785** ↑93

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Note: Acreage estimations do not include areas covered by water. Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

Potential Hearing Loss (PHL)

Table 4-25 presents the results of the assessment, and Figure 4-22 shows areas in which persons could potentially be at risk for PHL.

Under Alternative 2C, 105 on-installation buildings would be affected by noise greater than 80 dB DNL on Eglin Main Base. On Duke Field, 82 buildings would be affected. Six on-installation buildings would be affected by noise greater than 80 dB DNL on Choctaw Field. None of the affected on-base buildings include residential housing. The number of on-base personnel at risk for PHL will be analyzed in a separate study, as discussed under Alternative 1A.

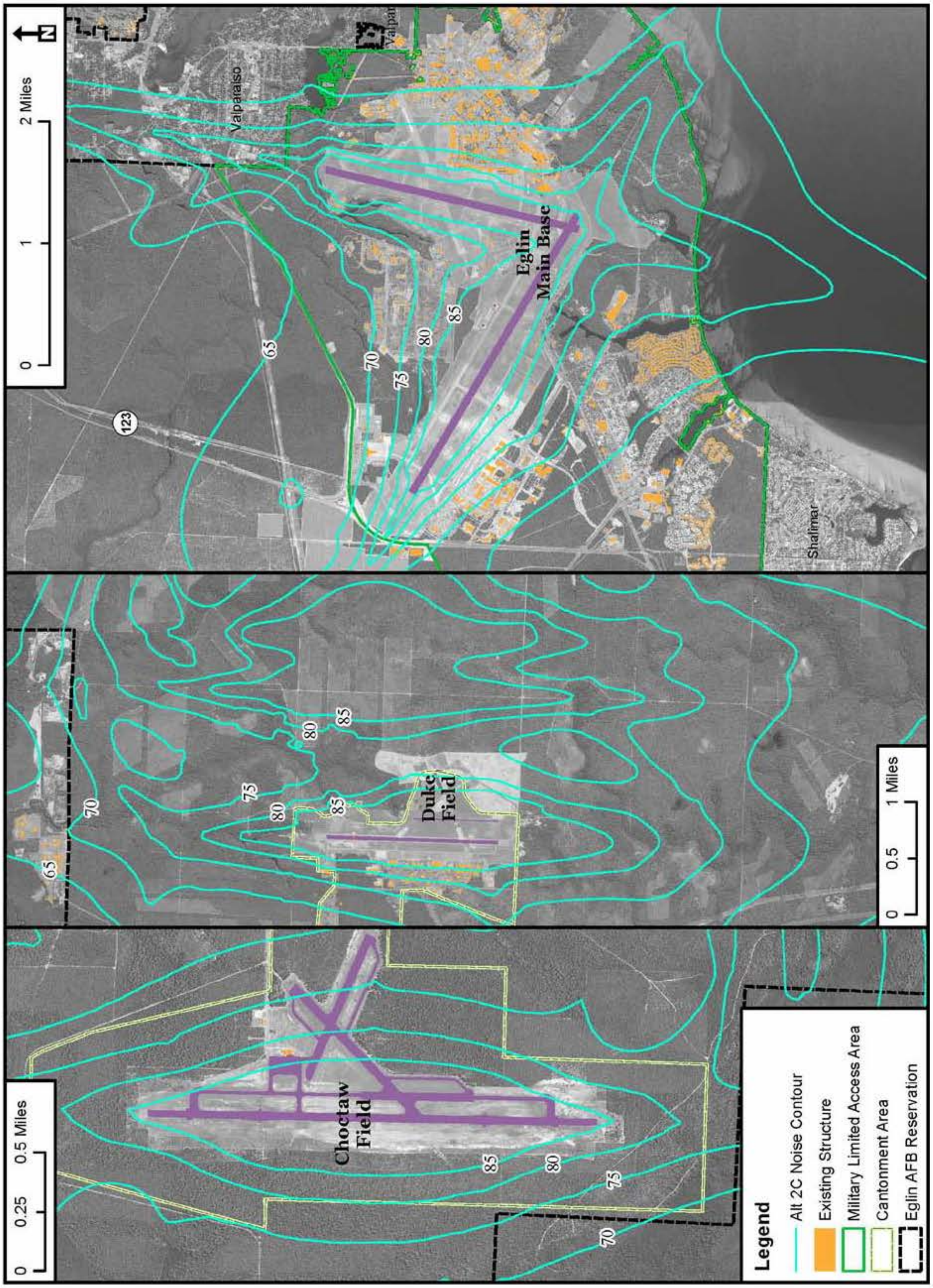


Figure 4-22. Potential Hearing Loss Risk Under Alternative 2C from F-35 and All Other Aircraft

It is estimated that 17 individuals may be exposed to aircraft noise within the 80 to 81 dB DNL contour surrounding Eglin AFB (Table 4-25). These individuals could experience as much as a 3.0 dB Average NIPTS in their hearing were they to remain in that location and under those same conditions for 40 years. Likewise, the most sensitive 10 percent of the 16 individuals are expected to experience no more degradation to their hearing than an Average NIPTS hearing loss of 7.0 dB.

Table 4-25. Off-Installation Population Exposed to Noise Levels that Could Result in NIPTS Under Alternative 2C

Contour Band (dB DNL)	Estimated Population
80–81	17
81–82	0
82–83	0
83–84	0
84–85	0
85–86	0
86–87	0
87–88	0
88–89	0
89–90	0
Total	**17**

dB = decibels; DNL = day-night average sound level; NIPTS = Noise-Induced Permanent Threshold Shift

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Aircraft noise levels at several noise-sensitive locations under the No Action Alternative and Alternative 2C are listed in Table 4-26. Noise levels are expressed as the overall DNL at the site and the range of individual overflight noise levels (SEL metric) of the 20 types of flights that contribute most to the overall DNL noise level. Individual overflights may exceed the maximum SEL value of the range stated in Table 4-26, but such overflights would be relatively rare occurrences. Additional details regarding the types of flights contributing most to overall noise levels can be found in the Appendix E table, entitled “Top Contributor Flight Profiles to Overall Time-Averaged Noise Levels at Representative Noise-Sensitive Locations Under Alternative 2C.” A map showing these representative noise-sensitive locations can be found in Chapter 3 (Figure 3-6).

Under Alternative 2C, DNL noise levels at noise-sensitive locations near Eglin Main Base would increase by 1 dB or less, while other locations near Eglin Main Base would remain the same or decrease. DNL noise levels at locations near Choctaw Field would increase by 1 dB or remain the same, while the noise level at SP29 (residential area south of Crestview) would increase by 8 dB. Of the increases that would occur under Alternative 2C, only the increase at SP29 would be expected to be noticeable relative to the No Action Alternative. The range of noise levels generated by the 20 types of single overflight events contributing most to overall DNL noise levels would be similar to the range of overflight noise levels under the No Action Alternative.

Table 4-26. Representative Noise-Sensitive Receptors Under Alternative 2C[1]

Location ID	General Description	No Action		Alternative 2C	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP01	Eglin Housing (Capehart)	70	108	68	89–108
SP02	Eglin Housing (Ben's Lake)	70	108	67	95–108
SP03	Chapel 2 – building 2574	70	111	67	94–111
SP04	Cherokee Elementary School	70	110	67	96–110
SP05	Child Development Center	72	112	69	90–110
SP06	Oakhill School (closed in 2009)	77	117	73	99–117
SP07	Eglin Hospital	64	107	61	88–102
SP08	Eglin VAQ and Dorms	69	106	68	91–106
SP09	Eglin Chapel 1	66	102	64	87–102
SP10	Joint Strike Fighter Academic Training Facility	76	115	73	101–115
SP11	Lewis Middle School	62	99	61	84–99
SP12	Okaloosa STEMM Center (Valparaiso)[3]	65	111	66	83–111
SP13	First Assembly of God (Valparaiso)	68	115	69	89–115
SP14	New Hope Baptist (Valparaiso)	68	115	69	89–115
SP15	Sovereign Grace Church (Valparaiso)	63	107	64	81–107
SP16	First Baptist Church (Valparaiso)	62	105	62	83–105
SP17	Unitarian Church (Valparaiso)	58	100	58	79–100
SP18	#1 Housing (Valparaiso)	68	114	69	87–114
SP19	#2 Housing (Valparaiso)	71	119	72	89–120
SP20	Edge Elementary School	58	105	59	82–105
SP21	Twin Cities Medical Center	60	108	61	83–108
SP22	Niceville Community Church	74	123	74	85–123
SP23	Private School (Niceville)	78	126	78	96–126
SP24	Private School (Fort Walton)	55	99	54	75–99
SP25	Okaloosa Walton College	53	95	52	72–95
SP26	Kenwood Elementary	54	97	53	75–97
SP27	Pryor Middle School	53	95	52	73–95
SP28	Housing (Fort Walton Beach)	55	99	54	75–99
SP29	Residential property south of Hwy 90 in Crestview	49	92	57	80–98
SP30	Shalimar Elementary School	58	103	53	75–93
SP31	Shalimar Residential	60	103	56	75–94
SP32	Residential Poquito Bayou West Side	58	100	53	75–94
SP33	University of Florida Research and Engineering Education Facility	63	110	58	82–102
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	70	107	68	91–107
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	74	112	73	96–112
SP36	Eglin Law Center (building 2)	75	113	74	97–113
SP37	Saint Sylvester Catholic Church, Gulf Breeze	<45	75	<45	51–75
SP38	Residential, north of Choctaw	<45	77	<45	54–77
SP39	Residential, south of Choctaw	48	84	48	62–84

Table 4-26. Representative Noise-Sensitive Receptors Under Alternative 2C[1], Cont'd

Location ID	General Description	No Action		Alternative 2C	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP40	Okaloosa County Prison	60	109	64	90–107

dB = decibels; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level; STEMM = Science, Technology, Engineering, Mathematics, and Medical
1. Schools, hospitals, and churches presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.
2. Top 20 SEL refers to the range of SEL decibel noise levels generated by the 20 profiles that contribute most to overall DNL noise level at that location. Refer to Appendix E, *Noise*, for tables that describe the top 20 profiles.
3. Previously Valparaiso Elementary School.
Note: Calculated military noise below the DNL ambient sound level of 45 dB is listed as <45 dB

Equivalent Sound Level (L_{eq}) at Representative Local Schools

Table 4-27 lists the hourly L_{eq} under the No Action Alternative during a typical school day (7:00 AM – 4:00 PM, Monday–Friday) at several schools located near Eglin Main Base. The minimum and maximum hourly L_{eq} values provide the expected range of noise levels to which the schools could be exposed on a typical day. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI standard for at least a portion of one hour during a typical school day. The Appendix E table, entitled "Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2C," lists hourly L_{eq} for each hour of the school day, giving some indication as to which hours of the day might be more disruptive of learning.

Table 4-27. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2C[1]

Location ID	General Description	Minimum Indoor Hourly L_{eq}[2]	Maximum Indoor Hourly L_{eq}[2]
SP04	Cherokee Elementary School	<=40	45
SP05	Child Development Center	<=40	47
SP06	Oakhill School (closed in 2009)	42	51
SP11	Lewis Middle School	<=40	<=40
SP12	Okaloosa STEMM Center (Valparaiso)[3]	<=40	44
SP20	Edge Elementary School	<=40	<=40
SP23	Private School (Niceville)	47	56
SP24	Private School (Fort Walton)	<=40	<=40
SP26	Kenwood Elementary	<=40	<=40
SP27	Pryor Middle School	<=40	<=40
SP30	Shalimar Elementary School	<=40	<=40

ID = identification code; L_{eq} = equivalent sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical
1. Schools presented in this table are provided to help understand the noise environment. As such, this table may not include all schools that are affected by noise contours.
2. Indoor L_{eq} is assumed to be 25 decibels less than outdoor L_{eq} due to the noise level reduction provided by the structure with windows closed. Actual outdoor-to-indoor noise level reduction varies from school to school and between locations within individual schools.
3. Previously Valparaiso Elementary School.
Note: Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <=40 dB.

The locations of the assessed schools are shown in Figure 3-6. Under Alternative 2C, two active schools, an educational center, and a daycare would exceed the recommended noise guidelines. Oakhill School closed in 2009 due to factors not related to noise.

Number of Noise Events Analysis

Table 4-28 provides a list of locations and the number of times during a day that one might experience disruption of communications or activities based on the possible number of noise events exceeding an L_{max} of 50 dB from all flight operations (including non-JSF operations) under the No Action Alternative and under Alternative 2C. For example, an individual living in Eglin's Capehart housing (SP01) would typically experience as many as 159 disruptive events per day under the No Action Alternative, while under Alternative 2C the resident could experience as many as 90 disruptive events each day.

Table 4-28. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2C

Location ID	Location of Interest	No Action Alternative	Alternative 2C
SP01	Eglin Housing (Capehart)	159	90
SP02	Eglin Housing (Ben's Lake)	157	81
SP03	Chapel 2 - building 2574	151	71
SP04	Cherokee Elementary School	156	75
SP05	Child Development Center	155	86
SP06	Oakhill School (closed in 2009)	162	87
SP07	Eglin Hospital	119	50
SP08	Eglin VAQ and Dorms	135	72
SP09	Eglin Chapel 1	127	68
SP10	Joint Strike Fighter Academic Training Facility	168	70
SP11	Lewis Middle School	109	58
SP12	Okaloosa STEMM Center (Valparaiso)	121	70
SP13	First Assembly of God (Valparaiso)	133	80
SP14	New Hope Baptist (Valparaiso)	124	78
SP15	Sovereign Grace Church (Valparaiso)	114	56
SP16	First Baptist Church (Valparaiso)	109	51
SP17	Unitarian Church (Valparaiso)	36	35
SP18	#1 Housing (Valparaiso)	134	81
SP19	#2 Housing (Valparaiso)	90	111
SP20	Edge Elementary School	18	54
SP21	Twin Cities Medical Center	22	58
SP22	Niceville Community Church	113	137
SP23	Private School (Niceville)	121	143
SP24	Private School (Fort Walton)	20	11
SP25	Okaloosa Walton College	10	6
SP26	Kenwood Elementary	16	8
SP27	Pryor Middle School	12	8
SP28	Housing (Fort Walton Beach)	19	11

Table 4-28. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2C, Cont'd

Location ID	Location of Interest	No Action Alternative	Alternative 2C
SP29	Residential property south of Hwy 90 in Crestview	7	52
SP30	Shalimar Elementary School	23	14
SP31	Shalimar Residential	40	23
SP32	Residential Poquito Bayou West Side	26	16
SP33	University of Florida Research and Engineering Education Facility	73	33
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	137	73
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	163	91
SP36	Eglin Law Center (building 2)	168	95
SP37	Saint Sylvester Catholic Church, Gulf Breeze	0	0
SP38	Residential, north of Choctaw	0	0
SP39	Residential, south of Choctaw	1	1
SP40	Okaloosa County Prison	41	55

< = less than; dB = decibels; DNL = day-night average sound level; HQ = Headquarters; Hwy = Florida Highway; L_{max} = maximum sound level; ID = identification code; STEMM = Science, Technology, Engineering, Mathematics, and Medical

4.3.3.4 *Alternative 2D – Duke Field Single Runway Plus Eglin Runway 12 and Choctaw Field*

Flight Operations

Day-Night Average Sound Level (DNL)

Under Alternative 2D, the expected frequency of afterburner departures and aircraft operations between 10:00 PM and 7:00 AM would be as shown in Table 4-29**.** Afterburner departures generate more noise than non-afterburner departures, and flights during the "late night" time period between 10:00 PM and 7:00 AM would be more likely to disturb sleep or other activities that require a quiet environment.

Table 4-29. Afterburner Departures and "Late Night" Flying Operations (10:00 PM–7:00 AM) Under Alternative 2D

Operation	Eglin Main Base		Duke Field		Choctaw Field	
	% Afterburner	% Late Night	% Afterburner	% Late Night	% Afterburner	% Late Night
Departures	0%	1%	59%	0%	0%	1%
Arrivals	n/a	1%	n/a	3%	n/a	1%
Closed Patterns	n/a	1%	n/a	3%	n/a	1%

Note: The numbers listed in the table represent the percentage of total operations at each airfield.

Noise contours associated with Alternative 2D are shown in Figure 4-23. Noise levels in the vicinity of Duke Field under Alternative 2D are depicted in Figure 4-24. Noise levels in the vicinity of Duke Field under Alternative 2D *and* the No Action Alternative are depicted in Figure 4-25. Table 4-30 lists the on-base acreage, off-base acreage, estimated off-base population, and residential parcels impacted by various noise levels in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field under Alternative 2D.

The number of acres affected by off-installation noise greater than 65 dB DNL would increase from 693 under the No Action Alternative to 738 under Alternative 2D near Eglin Main Base. Near Duke Field, the number of acres affected by off-installation noise levels greater than 65 dB would increase from 1 acre under the No Action Alternative to 708 acres. The area between Eglin Main Base and Duke Field would be impacted by noise from JSF operations at both installations. Acreage affected by noise greater than 65 dB DNL would decrease from 2,128 to 2,108 acres near Choctaw Field. The number of off-installation residents affected by noise levels between 65 and 75 dB DNL would increase from 1,623 to 1,685 near Eglin AFB relative to the No Action Alternative. The number affected by noise exceeding 75 dB DNL would increase from 174 to 242 relative to the No Action Alternative. The number of off-installation residents near Duke Field impacted by 65 to 75 dB DNL would increase from less than 1 to 774.

Table 4-30. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2D

Noise Level (dB DNL)	Acres OFF-Installation by Airfield			TOTAL Acres OFF-Installation	TOTAL Acres ON-Installation	Population OFF-Installation by Airfield			TOTAL Population OFF-Installation	Total Residential Parcels
	EGLIN	DUKE	CHOCTAW			EGLIN	DUKE	CHOCTAW		
65–69	397 (↑24)	659 (↑658)	804 (↓429)	1,860 (↑253)	10,855 (↑397)	1,015 (↑27)	654 (↑653)	1 (↓1)	1,670 (↑679)	464 (↑51)
70–74	242 (↑5)	49 (↑49)	1,279 (↑443)	1,570 (↑497)	13,185 (↑1,060)	670 (↑35)	120 (↑120)	1 (↑1)	791 (↑156)	243 (↑17)
75–79	93 (↑10)	0 (0)	25 (↓34)	118 (↓24)	4,515 (↓3)	229 (↑55)	0 (0)	0 (0)	229 (↑55)	78 (↑25)
80–84	6 (↑6)	0 (0)	0 (0)	6 (↑6)	2,423 (↓60)	13 (↑13)	0 (0)	0 (0)	13 (↑13)	0 (0)
>=85	0 (0)	0 (0)	0 (0)	0 (0)	3,480 (↑77)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
TOTAL	**738** (↑45)	**708** (↑707)	**2,108** (↓20)	**3,554** (↑732)	**34,458** (↑1,471)	**1,927** (↑130)	**774** (↑773)	**2** (0)	**2,703** (↑903)	785 (↑93)

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Note: Acreage estimations do not include areas covered by water. Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

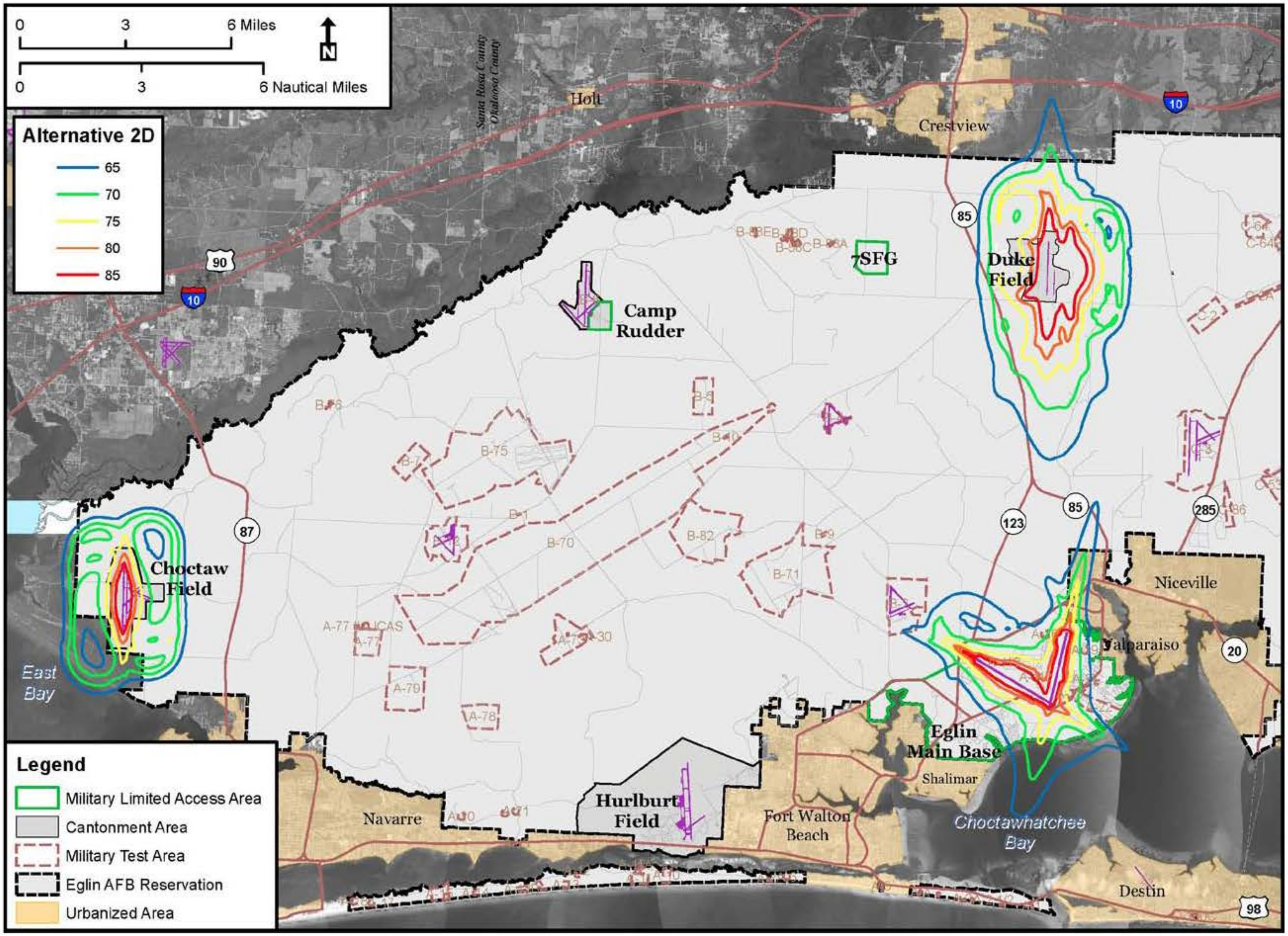


Figure 4-23. Noise Contours from F-35 and All Other Aircraft Under Alternative 2D in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field

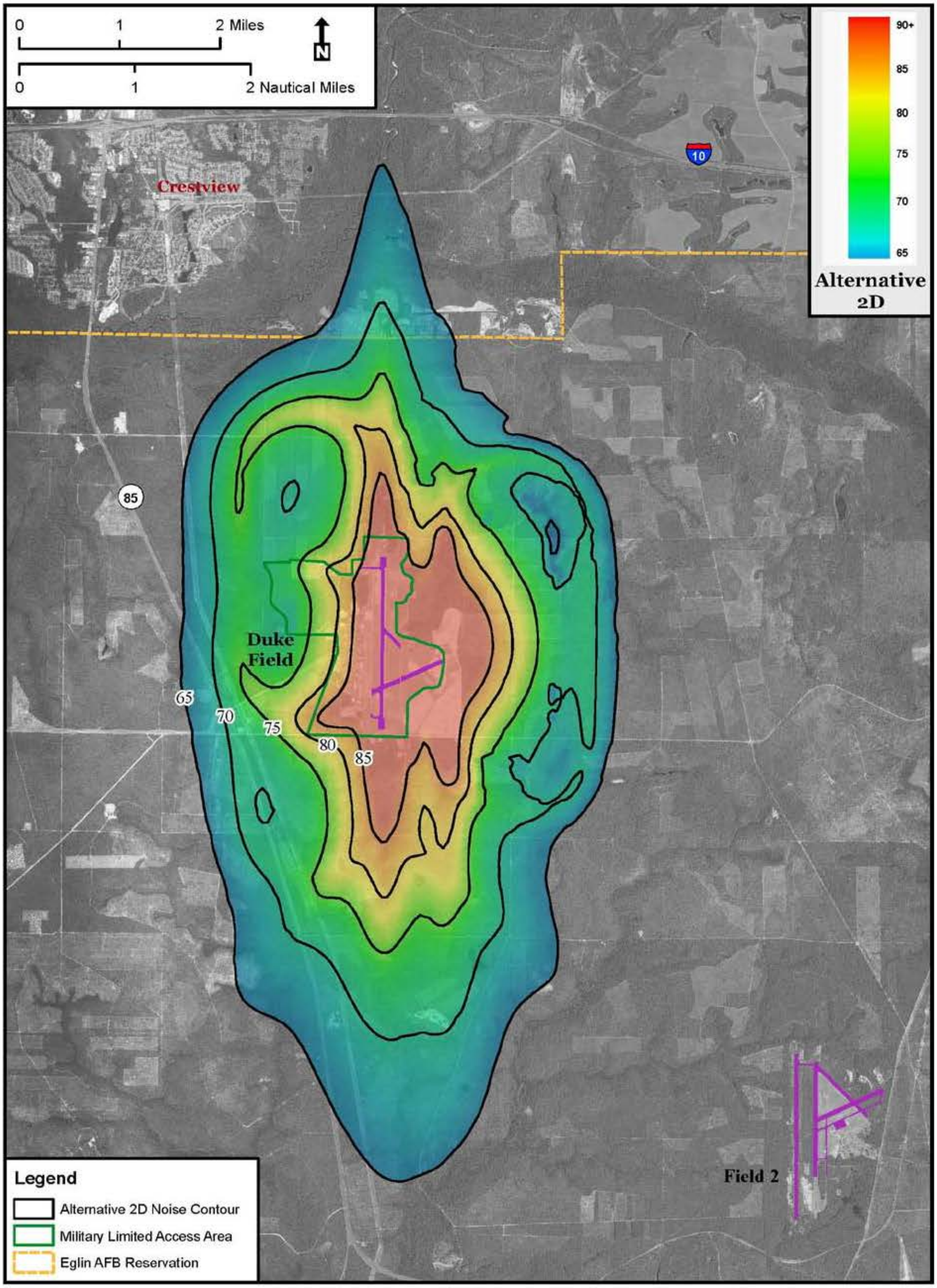


Figure 4-24. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2D

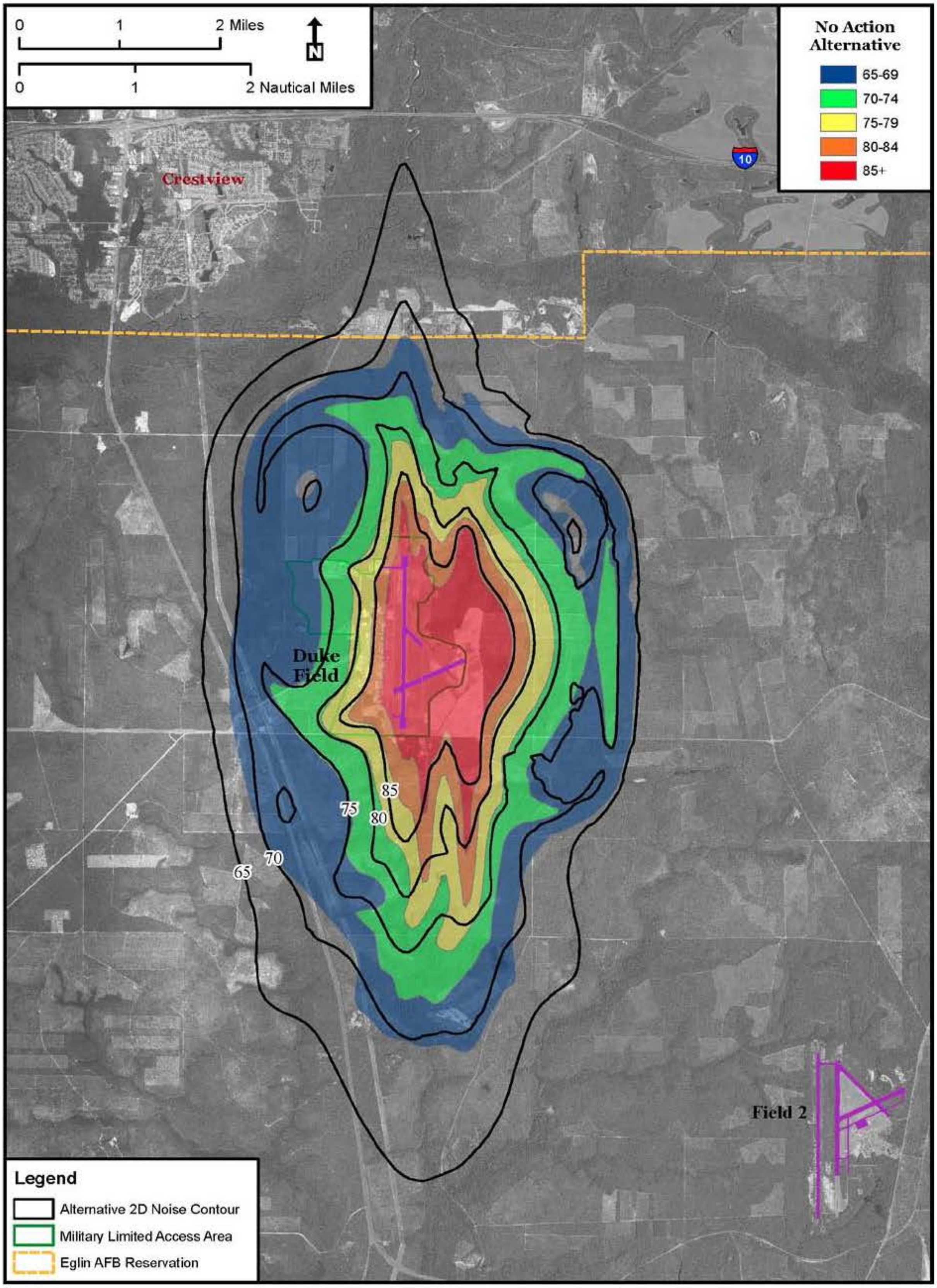


Figure 4-25. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2D and the No Action Alternative

Potential Hearing Loss (PHL)

Table 4-31 presents the results of the assessment, and Figure 4-26 shows areas in which persons could potentially be at risk for PHL.

Table 4-31. Off-Installation Population Exposed to Noise Levels that Could Result in NIPTS Under Alternative 2D

Contour Band(dB DNL)	Estimated Population
80–81	13
81–82	0
82–83	0
83–84	0
84–85	0
85–86	0
86–87	0
87–88	0
88–89	0
89–90	0
Total	**13**

dB = decibels; DNL = day-night average sound level; NIPTS = Noise-Induced Permanent Threshold Shift

Under Alternative 2D, 100 buildings on Eglin Main Base would be impacted by noise greater than 80 dB DNL. At Duke Field, 115 buildings would be impacted, and at Choctaw Field, 6 buildings would be affected. None of the affected on-base buildings include residential housing. The number of on-base personnel at risk for PHL will be analyzed in a separate study, as discussed under Alternative 1A.

It is estimated that a total of 12 individuals in the vicinity of Eglin AFB may be exposed to aircraft noise within 80 dB DNL or greater (Table 4-31). These individuals could experience as much as a 3.0 dB Average NIPTS in their hearing were they to remain in that location and under those same conditions for 40 years. Likewise, the most sensitive 10 percent of the 13 individuals are expected to experience no more degradation to their hearing than an Average NIPTS hearing loss of 7.0 dB.

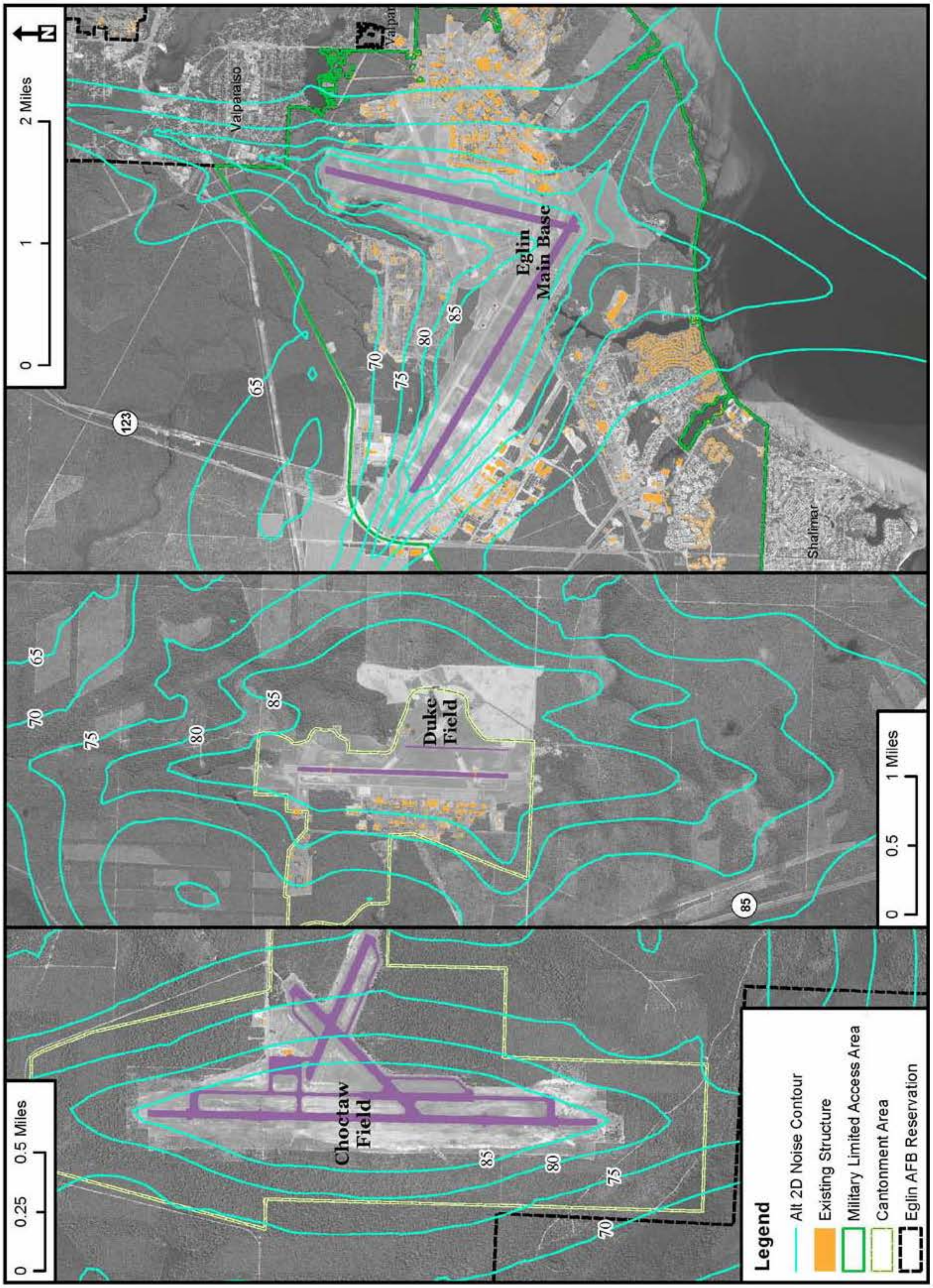


Figure 4-26. Potential Hearing Loss Risk Areas Under Alternative 2D from F-35 and All Other Aircraft

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Aircraft noise levels at several noise-sensitive locations under the No Action Alternative and Alternative 2D are listed in Table 4-32. Noise levels are expressed as the overall DNL at the site and the range of individual overflight noise levels (SEL metric) of the 20 types of flights that contribute most to the overall DNL noise level. Individual overflights may exceed the maximum SEL value of the range stated in Table 4-32, but such overflights would be relatively rare occurrences. Additional details regarding the types of flights contributing most to overall noise levels can be found in the Appendix E table, entitled "Top Contributor Flight Profiles to Overall Time-Averaged Noise Levels at Representative Noise-Sensitive Locations Under Alternative 2D." A map showing these representative noise-sensitive locations can be found in Chapter 3 (Figure 3-6).

Table 4-32. Representative Noise-Sensitive Receptors Under Alternative 2D[1]

Location ID	General Description	No Action		Alternative 2D	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP01	Eglin Housing (Capehart)	70	108	68	89–108
SP02	Eglin Housing (Ben's Lake)	70	108	66	92–108
SP03	Chapel 2 – building 2574	70	111	66	89–111
SP04	Cherokee Elementary School	70	110	66	93–110
SP05	Child Development Center	72	112	69	90–110
SP06	Oakhill School (closed in 2009)	77	117	73	99–115
SP07	Eglin Hospital	64	107	60	88–102
SP08	Eglin VAQ and Dorms	69	106	68	91–106
SP09	Eglin Chapel 1	66	102	64	87–102
SP10	Joint Strike Fighter Academic Training Facility	76	115	73	100–115
SP11	Lewis Middle School	62	99	61	84–99
SP12	Okaloosa STEMM Center (Valparaiso)[3]	65	111	66	83–111
SP13	First Assembly of God (Valparaiso)	68	115	69	83–115
SP14	New Hope Baptist (Valparaiso)	68	115	69	89–115
SP15	Sovereign Grace Church (Valparaiso)	63	107	64	81–107
SP16	First Baptist Church (Valparaiso)	62	105	62	81–105
SP17	Unitarian Church (Valparaiso)	58	100	58	79–100
SP18	#1 Housing (Valparaiso)	68	114	69	87–114
SP19	#2 Housing (Valparaiso)	71	119	72	89–120
SP20	Edge Elementary School	58	105	59	82–105
SP21	Twin Cities Medical Center	60	108	61	83–108
SP22	Niceville Community Church	74	123	74	85–123
SP23	Private School (Niceville)	78	126	78	96–126
SP24	Private School (Fort Walton)	55	99	54	75–99
SP25	Okaloosa Walton College	53	95	52	72–95
SP26	Kenwood Elementary	54	97	53	75–97
SP27	Pryor Middle School	53	95	52	73–95
SP28	Housing (Fort Walton Beach)	55	99	54	75–99
SP29	Residential property south of Hwy 90 in Crestview	49	92	54	80–94

Table 4-32. Representative Noise-Sensitive Receptors Under Alternative 2D[1], Cont'd

Location ID	General Description	No Action		Alternative 2D	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP30	Shalimar Elementary School	58	103	53	75–93
SP31	Shalimar Residential	60	103	56	75–94
SP32	Residential Poquito Bayou West Side	58	100	53	75–94
SP33	University of Florida Research and Engineering Education Facility	63	110	58	82–102
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	70	107	68	91–107
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	74	112	73	96–112
SP36	Eglin Law Center (building 2)	75	113	74	97–113
SP37	Saint Sylvester Catholic Church, Gulf Breeze	<45	75	<45	51–90
SP38	Residential, north of Choctaw	<45	77	<45	54–77
SP39	Residential, south of Choctaw	48	84	47	62–84
SP40	Okaloosa County Prison	60	109	66	90–106

dB = decibels; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools, hospitals, and churches presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.
2. Top 20 SEL refers to the range of SEL decibel noise levels generated by the 20 profiles that contribute most to overall DNL noise level at that location. Refer to Appendix E, *Noise*, for tables that describe the top 20 profiles.
3. Previously Valparaiso Elementary School.

Note: Calculated military noise below the DNL ambient sound level of 45 dB is listed as <45 dB.

Under Alternative 2D, DNL noise levels at noise-sensitive locations near Eglin Main Base would increase by 1 dB or less, while other locations near Eglin Main Base would remain the same or decrease. DNL noise levels at locations near Duke Field and Choctaw Field would increase by up to 5 dB or remain the same. The range of noise levels generated by the 20 types of single overflight events contributing most to overall DNL noise levels would be similar to the range of overflight noise levels under the No Action Alternative.

Equivalent Sound Level (L_{eq}) at Representative Local Schools

Table 4-33 lists the hourly L_{eq} under the No Action Alternative during a typical school day (7:00 AM – 4:00 PM, Monday–Friday) at several schools located near Eglin Main Base. The minimum and maximum hourly L_{eq} values provide the expected range of noise levels to which the schools could be exposed on a typical day. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI standard for at least a portion of one hour during a typical school day. The Appendix E table, entitled "Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Base Under Alternative 2D," lists hourly L_{eq} for each hour of the school day, giving some indication as to which hours of the day might be more disruptive of learning.

Table 4-33. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2D[1]

Location ID	General Description	Minimum Indoor Hourly L_{eq}[2]	Maximum Indoor Hourly L_{eq}[2]
SP04	Cherokee Elementary School	<=40	45
SP05	Child Development Center	<=40	47
SP06	Oakhill School (closed in 2009)	42	51
SP11	Lewis Middle School	<=40	<=40
SP12	Okaloosa STEMM Center (Valparaiso)[3]	<=40	44
SP20	Edge Elementary School	<=40	<=40
SP23	Private School (Niceville)	47	56
SP24	Private School (Fort Walton)	<=40	<=40
SP26	Kenwood Elementary	<=40	<=40
SP27	Pryor Middle School	<=40	<=40
SP30	Shalimar Elementary School	<=40	<=40

< = less than; ANSI = American National Standards Institute; ID = identification code; L_{eq} = equivalent sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools presented in this table are provided to help understand the noise environment. As such, this table may not include all schools that are affected by noise contours.
2. Indoor L_{eq} is assumed to be 25 decibels less than outdoor L_{eq} due to the noise level reduction provided by the structure with windows closed. Actual outdoor-to-indoor noise level reduction varies from school to school and between locations within individual schools.
3. Previously Valparaiso Elementary School.

Note: Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <=40 dB.

The locations of the assessed schools are shown in Figure 3-6. Under Alternative 2D, two active schools, an educational center, and a daycare would exceed the recommended noise guidelines. Oakhill School closed in 2009 due to factors not related to noise.

Number of Noise Events Analysis

Table 4-34 provides a list of locations and the number of times during a day that one might experience disruption of communications or activities based on the possible number of noise events exceeding an L_{max} of 50 dB from all flight operations (including non-JSF operations) under the No Action Alternative and under Alternative 2D. For example, an individual living in Eglin's Capehart housing (SP01) would typically experience as many as 159 disruptive events per day under the No Action Alternative, while under Alternative 2D the resident could experience as many as 91 disruptive events each day.

Table 4-34. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2D

Location ID	Location of Interest	No Action Alternative	Alternative 2D
SP01	Eglin Housing (Capehart)	159	91
SP02	Eglin Housing (Ben's Lake)	157	83
SP03	Chapel 2 - building 2574	151	73
SP04	Cherokee Elementary School	156	77
SP05	Child Development Center	155	87
SP06	Oakhill School (closed in 2009)	162	89
SP07	Eglin Hospital	119	50
SP08	Eglin VAQ and Dorms	135	74
SP09	Eglin Chapel 1	127	69
SP10	Joint Strike Fighter Academic Training Facility	168	70
SP11	Lewis Middle School	109	56
SP12	Okaloosa STEMM Center (Valparaiso)	121	70
SP13	First Assembly of God (Valparaiso)	133	80
SP14	New Hope Baptist (Valparaiso)	124	78
SP15	Sovereign Grace Church (Valparaiso)	114	56
SP16	First Baptist Church (Valparaiso)	109	51
SP17	Unitarian Church (Valparaiso)	36	36
SP18	#1 Housing (Valparaiso)	134	83
SP19	#2 Housing (Valparaiso)	90	113
SP20	Edge Elementary School	18	55
SP21	Twin Cities Medical Center	22	60
SP22	Niceville Community Church	113	138
SP23	Private School (Niceville)	121	145
SP24	Private School (Fort Walton)	20	11
SP25	Okaloosa Walton College	10	6
SP26	Kenwood Elementary	16	8
SP27	Pryor Middle School	12	8
SP28	Housing (Fort Walton Beach)	19	11
SP29	Residential property south of Hwy 90 in Crestview	7	17
SP30	Shalimar Elementary School	23	14
SP31	Shalimar Residential	40	23
SP32	Residential Poquito Bayou West Side	26	16
SP33	University of Florida Research and Engineering Education Facility	73	33
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	137	74
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	163	93
SP36	Eglin Law Center (building 2)	168	97
SP37	Saint Sylvester Catholic Church, Gulf Breeze	0	0
SP38	Residential, north of Choctaw	0	0
SP39	Residential, south of Choctaw	1	1
SP40	Okaloosa County Prison	41	104

< = less than; dB = decibels; DNL = day-night average sound level; HQ = Headquarters; Hwy = Florida Highway; ID = identification code; L_{max} = maximum sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

4.3.3.5 *Alternative 2E – Duke Field Single Runway Plus Choctaw Field*

Flight Operations

Day-Night Average Sound Level (DNL)

Under Alternative 2E, the frequency of afterburner departures and aircraft operations between 10:00 PM and 7:00 AM would be as listed in Table 4-35. Afterburner departures generate more noise than non-afterburner deparures, and flights during the "late night" time period between 10:00 PM and 7:00 AM would be more likely to disturb sleep or other activities that require a quiet environment.

Table 4-35. Afterburner Departures and "Late Night" Flying Operations (During 10:00 PM–7:00 AM) Under Alternative 2E

Operation	Eglin Main Base		Duke Field		Choctaw Field	
	% Afterburner	% Late Night	% Afterburner	% Late Night	% Afterburner	% Late Night
Departures	n/a	n/a	59%	0%	0%	1%
Arrivals	n/a	n/a	n/a	3%	n/a	1%
Closed Patterns	n/a	n/a	n/a	3%	n/a	1%

Note: The numbers listed in the table represent the percentage of total operations at each airfield.

Figure 4-27 shows noise contours near Eglin Main Base, Duke Field, and Choctaw Field. Noise levels in the vicinity of Duke Field under Alternative 2E are depicted in Figure 4-28. Noise levels in the vicinity of Duke Field under Alternative 2E *and* the No Action Alternative are depicted in Figure 4-29**.**

Table 4-36 lists the on-base acreage, off-base acreage, estimated off-base population, and residential parcels impacted by various noise levels in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field under Alternative 2E.

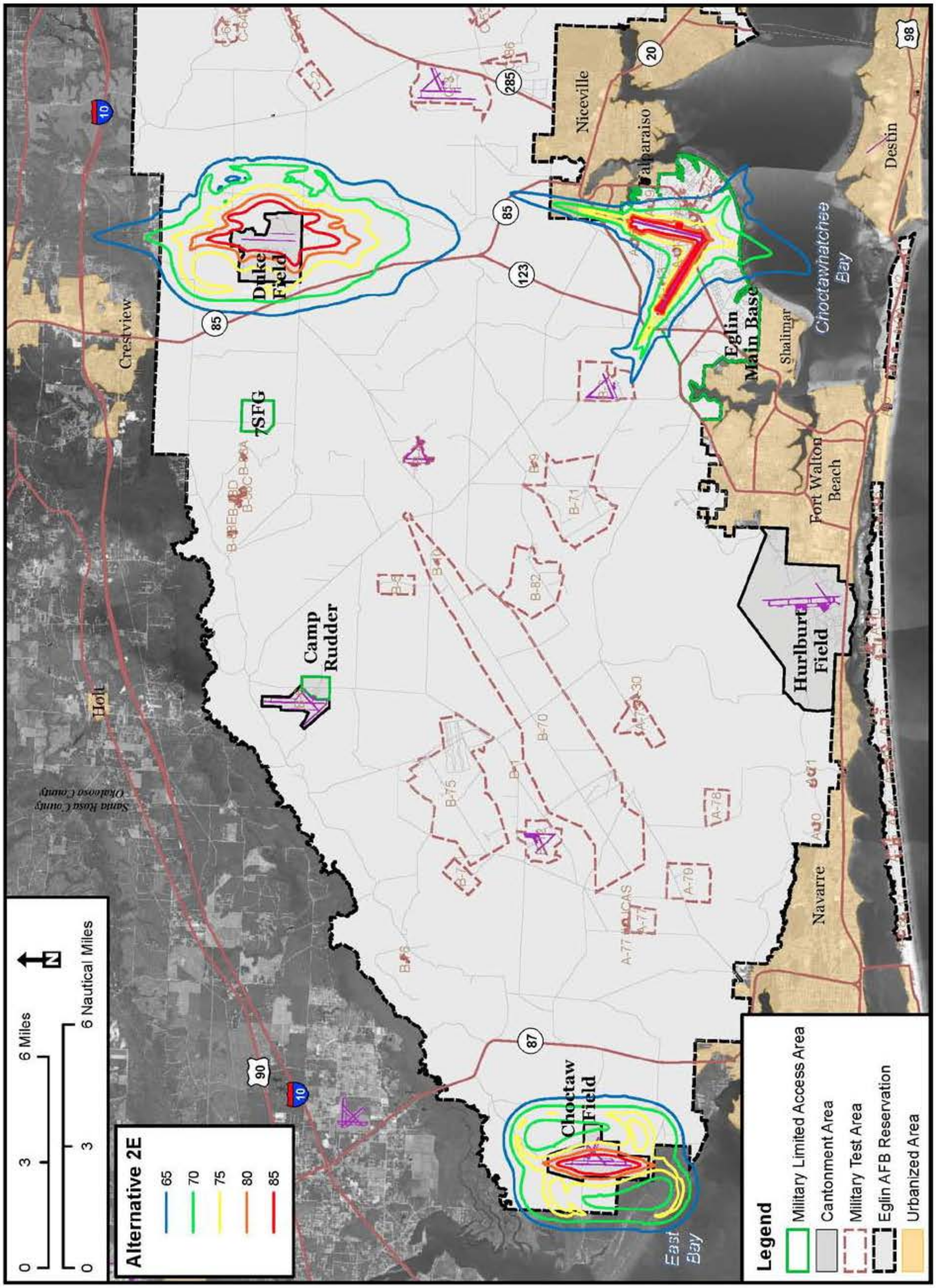


Figure 4-27. Noise Contours from F-35 and All Other Aircraft Under Alternative 2E in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field

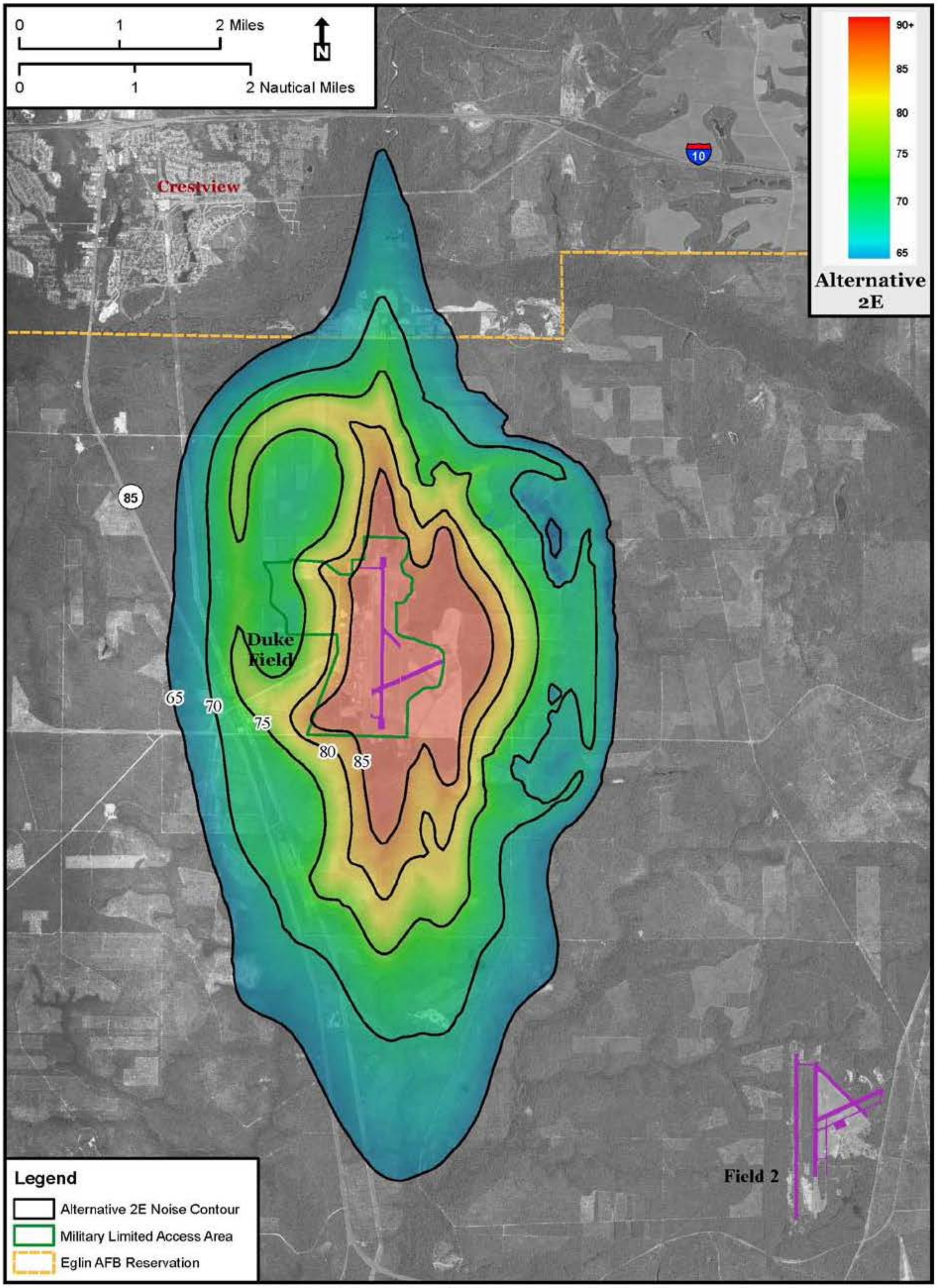


Figure 4-28. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2E

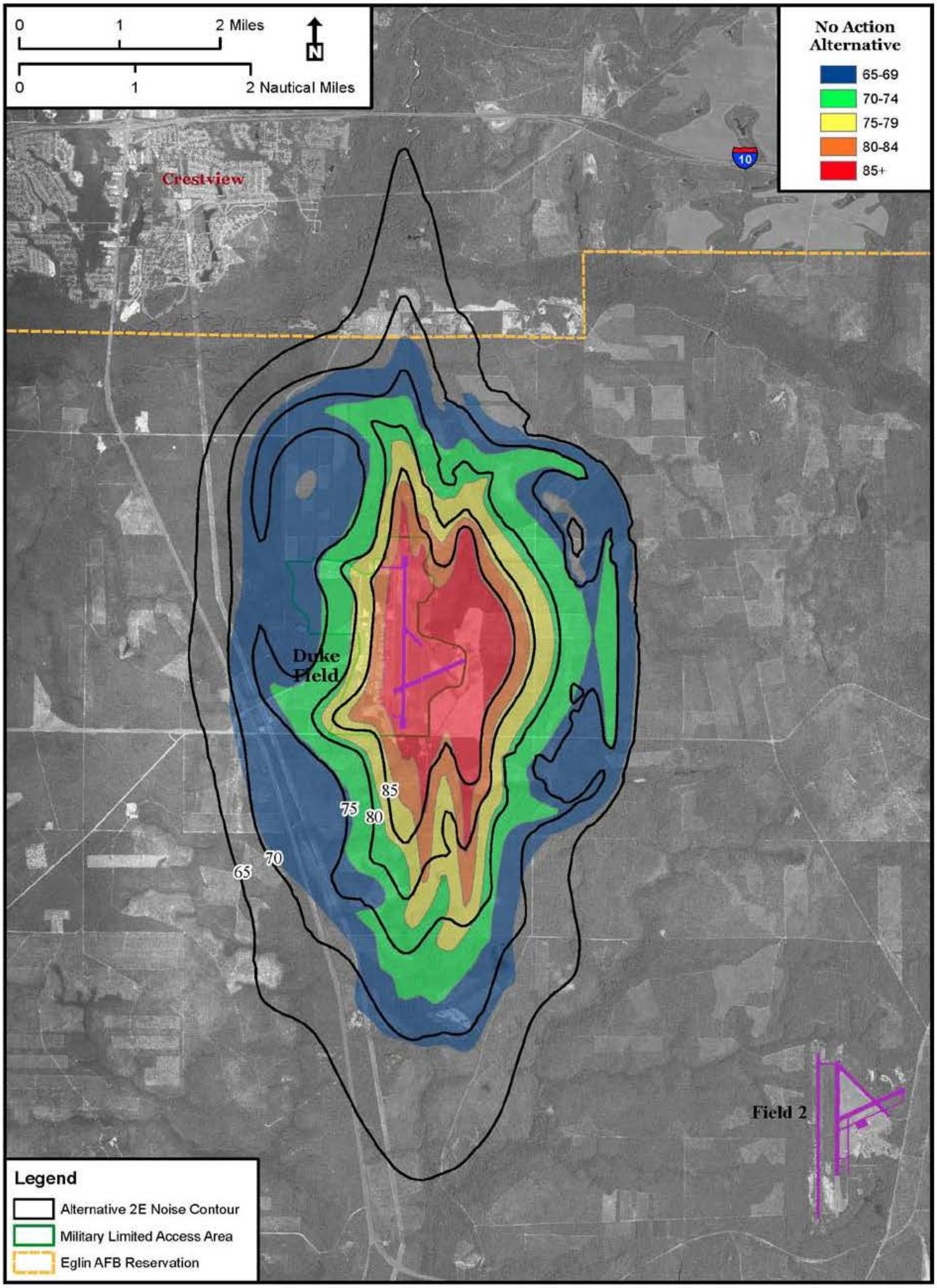


Figure 4-29. Noise Levels from F-35 and All Other Aircraft in the Vicinity of Duke Field Under Alternative 2E and the No Action Alternative

Table 4-36. Acreage and Population Affected by Elevated Noise Levels Under Alternative 2E

Noise Level (dB DNL)	Acres OFF-Installation by Airfield: EGLIN	Acres OFF-Installation by Airfield: DUKE	Acres OFF-Installation by Airfield: CHOCTAW	TOTAL Acres OFF-Installation	TOTAL Acres ON-Installation	Population OFF-Installation by Airfield: EGLIN	Population OFF-Installation by Airfield: DUKE	Population OFF-Installation by Airfield: CHOCTAW	TOTAL Population OFF-Installation	Total Residential Parcels
65–69	331 ↓42	719 ↑718	593 ↓640	1,643 ↑36	9,733 ↓725	861 ↓127	678 ↑677	1 ↓1	1,540 ↑549	343 ↓70
70–74	194 ↓43	61 ↑61	1,650 ↑814	1,905 ↑832	11,701 ↓424	482 ↓153	150 ↑150	1 ↑1	633 ↓2	162 ↓64
75–79	80 ↓3	0 ■0	188 ↑129	268 ↑126	5,397 ↑879	198 ↑24	0 ■0	0 ■0	198 ↑24	68 ↑15
80–84	0 ■0	0 ■0	0 ■0	0 ■0	2,334 ↓149	0 ■0	0 ■0	0 ■0	0 ■0	0 ■0
>=85	0 ■0	0 ■0	0 ■0	0 ■0	3,109 ↓294	0 ■0	0 ■0	0 ■0	0 ■0	0 ■0
TOTAL	**605** ↓88	**780** ↑779	**2,431** ↑303	**3,816** ↑994	**32,274** ↓713	**1,541** ↓256	**828** ↑827	**2** ■0	**2,371** ↑571	**573** ↓119

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Note: Acreage estimations do not include areas covered by water. Population estimates were made based on 2010 U.S. Census Bureau data. The number of persons currently residing in affected areas may differ from what has been stated.

Impacts associated with implementing Alternative 2E would be the same as impacts described for Alternative 2A but would differ in the acreage and population impacted. The extent of the impacts is described below.

The number of acres affected by off-installation noise greater than 65 dB DNL would decrease from 693 under the No Action Alternative to 605 under Alternative 2E near Eglin Main Base. Near Duke Field, the number of acres affected by off-installation noise levels greater than 65 dB would increase from 1 acre under the No Action Alternative to 780 acres. The area between Eglin Main Base and Duke Field would be impacted by noise from JSF operations at both installations. Acreage affected by noise greater than 65 dB DNL would increase from 2,128 to 2,431 acres near Choctaw Field. The number of off-installation residents affected by noise levels between 65 and 75 dB DNL would decrease from 1,623 to 1,343 near Eglin AFB relative to the No Action Alternative. The number affected by noise exceeding 75 dB DNL would increase from 174 to 198 relative to the No Action Alternative. The number of off-installation residents near Duke Field impacted by 65 to 75 dB DNL would increase from 1 to 828, and persons exposed at greater than 75 dB DNL would remain the same.

Potential Hearing Loss (PHL)

Under Alternative 2E, no persons residing off-installation could be exposed to noise levels greater than 80 dB DNL. This is a result of no JSF operations at Eglin Main Base under Alternative 2E. Under Alternative 2E, 30 buildings on Eglin Main Base would be impacted by noise greater than 80 dB DNL. At Duke Field, 121 buildings would be affected, and at Choctaw Field, 8 buildings would be affected. None of the affected on-base buildings include residential housing. The number of on-base personnel at risk for PHL will be analyzed in a separate study, as discussed under Alternative 1A. Areas exposed to noise at levels that could result in PHL risk are shown in Figure 4-30.

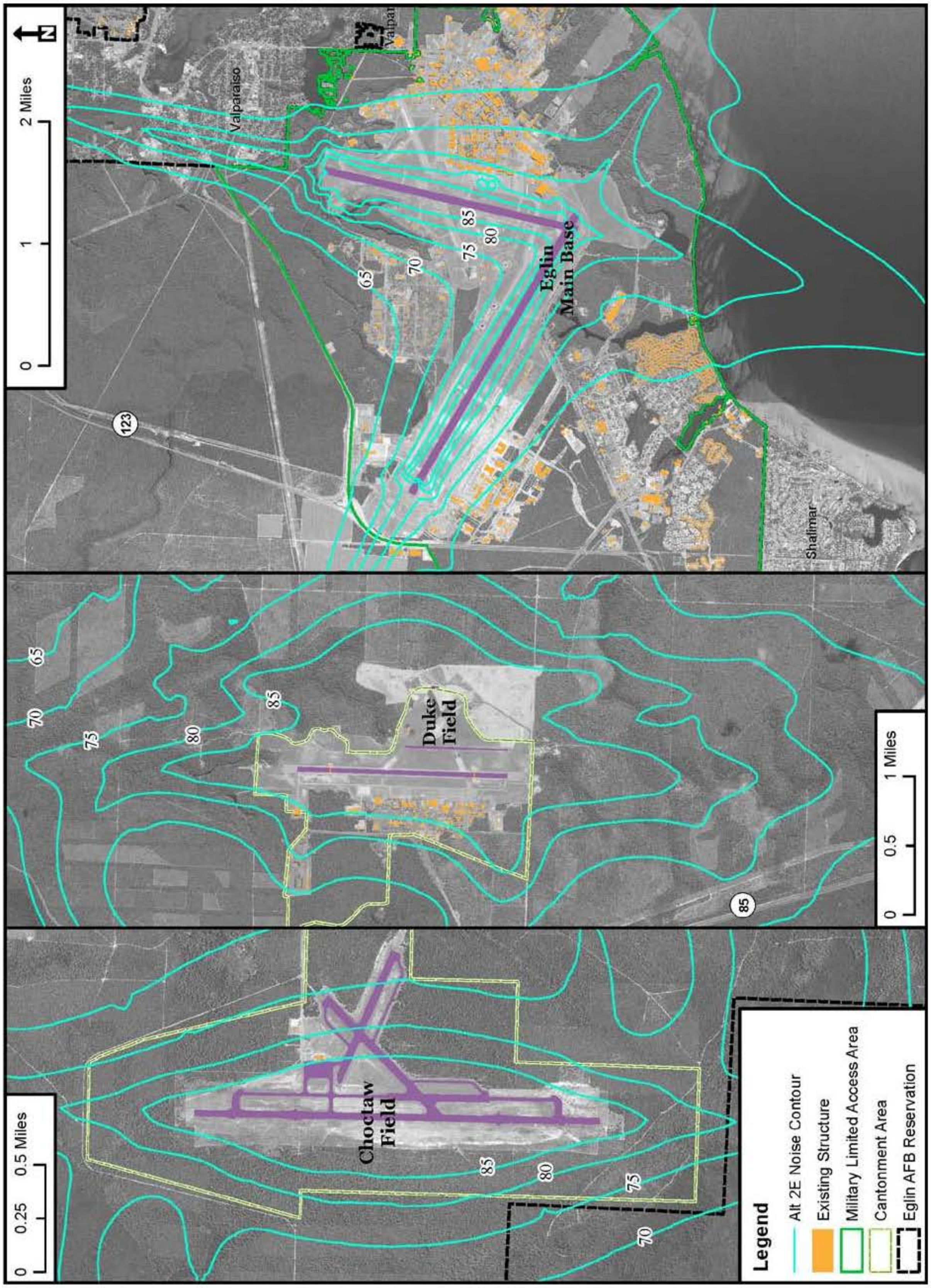


Figure 4-30. Potential Hearing Loss Risk Areas Under Alternative 2E from F-35 and All Other Aircraft

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Aircraft noise levels at several noise-sensitive locations under the No Action Alternative and Alternative 2E are listed in Table 4-37. Noise levels are expressed as the overall DNL at the site and the range of individual overflight noise levels (SEL metric) of the 20 types of flights that contribute most to the overall DNL noise level. Individual overflights may exceed the maximum SEL value of the range stated in Table 4-37, but such overflights would be relatively rare occurrences. Additional details regarding the types of flights contributing most to overall noise levels can be found in the Appendix E table, entitled "Top Contributor Profiles to Overall Time-Averaged Noise Levels at Representative Noise-Sensitive Locations Under Alternative 2E." A map showing these representative noise-sensitive locations can be found in Chapter 3 (Figure 3-6).

Under Alternative 2E, DNL noise levels at noise-sensitive locations near Eglin Main Base would decrease or remain the same. DNL noise levels at locations near Duke Field and Choctaw Field would increase by varying amounts up to 5 dB. The range of noise levels generated by the 20 types of single overflight events contributing most to overall DNL noise levels would be similar to the range of overflight noise levels under the No Action Alternative.

Table 4-37. Representative Noise-Sensitive Receptors Under Alternative 2E[1]

Location ID	General Description	No Action		Alternative 2E	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP01	Eglin Housing (Capehart)	70	108	66	89–108
SP02	Eglin Housing (Ben's Lake)	70	108	62	85–103
SP03	Chapel 2 – building 2574	70	111	61	83–101
SP04	Cherokee Elementary School	70	110	62	83–102
SP05	Child Development Center	72	112	65	88–104
SP06	Oakhill School (closed in 2009)	77	117	68	88–109
SP07	Eglin Hospital	64	107	57	81–100
SP08	Eglin VAQ and Dorms	69	106	67	86–106
SP09	Eglin Chapel 1	66	102	63	80–102
SP10	Joint Strike Fighter Academic Training Facility	76	115	66	96–109
SP11	Lewis Middle School	62	99	60	77–99
SP12	Okaloosa STEMM Center (Valparaiso)[3]	65	111	65	83–111
SP13	First Assembly of God (Valparaiso)	68	115	68	85–115
SP14	New Hope Baptist (Valparaiso)	68	115	68	89–115
SP15	Sovereign Grace Church (Valparaiso)	63	107	62	81–107
SP16	First Baptist Church (Valparaiso)	62	105	61	79–105
SP17	Unitarian Church (Valparaiso)	58	100	57	75–100
SP18	#1 Housing (Valparaiso)	68	114	67	87–114
SP19	#2 Housing (Valparaiso)	71	119	89–119	89–119
SP20	Edge Elementary School	58	105	58	82–105
SP21	Twin Cities Medical Center	60	108	60	81–108
SP22	Niceville Community Church	74	123	74	85–123
SP23	Private School (Niceville)	78	126	78	87–126

Table 4-37. Representative Noise-Sensitive Receptors Under Alternative 2E[1], Cont'd

Location ID	General Description	No Action		Alternative 2E	
		DNL (dB)	Max SEL (dB)	DNL (dB)	Top 20 SELs (dB)[2]
SP24	Private School (Fort Walton)	55	99	54	75–99
SP25	Okaloosa Walton College	53	95	52	72–95
SP26	Kenwood Elementary	54	97	53	75–97
SP27	Pryor Middle School	53	95	52	73–95
SP28	Housing (Fort Walton Beach)	55	99	54	75–99
SP29	Residential property south of Hwy 90 in Crestview	49	92	54	80–94
SP30	Shalimar Elementary School	58	103	52	73–93
SP31	Shalimar Residential	60	103	55	75–94
SP32	Residential Poquito Bayou West Side	58	100	52	73–94
SP33	University of Florida Research and Engineering Education Facility	63	110	56	78–102
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	70	107	67	87–107
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	74	112	72	92–112
SP36	Eglin Law Center (building 2)	75	113	73	97–113
SP37	Saint Sylvester Catholic Church, Gulf Breeze	<45	75	<45	51–90
SP38	Residential, north of Choctaw	<45	77	<45	54–77
SP39	Residential, south of Choctaw	48	84	49	62–84
SP40	Okaloosa County Prison	60	109	66	88–106

< = less than; dB = decibels; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools, hospitals, and churches presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.
2. Top 20 SEL refers to the range of SEL decibel noise levels generated by the 20 profiles that contribute most to overall DNL noise level at that location. Refer to Appendix E, *Noise*, for tables that describe the top 20 profiles.
3. Previously Valparaiso Elementary School.

Note: Calculated military noise below the DNL ambient sound level of 45 dB is listed as <45 dB.

Equivalent Sound Level (L_{eq}) at Representative Local Schools

Table 4-38 lists the hourly L_{eq} under the No Action Alternative during a typical school day (7:00 AM – 4:00 PM, Monday–Friday) at several schools located near Eglin Main Base. The minimum and maximum hourly L_{eq} values provide the expected range of noise levels to which the schools could be exposed on a typical day. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI standard for at least a portion of one hour during a typical school day. The Appendix E table, entitled "Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2E," lists hourly L_{eq} for each hour of the school day.

The locations of the assessed schools are shown in Figure 3-6. Under Alternative 2E, one active school, an educational center, and a daycare, would exceed the recommended noise guidelines. Oakhill School closed in 2009 due to factors not related to noise.

Table 4-38. Hourly L_{eq} Noise Levels During the School Day at Representative Schools Near Eglin Main Under Alternative 2E[1]

Location ID	General Description	Minimum Indoor Hourly L_{eq}[2]	Maximum Indoor Hourly L_{eq}[2]
SP04	Cherokee Elementary School	<=40	<=40
SP05	Child Development Center	<=40	42
SP06	Oakhill School (closed in 2009)	<=40	45
SP11	Lewis Middle School	<=40	<=40
SP12	Okaloosa STEMM Center (Valparaiso)[3]	<=40	43
SP20	Edge Elementary School	<=40	<=40
SP23	Private School (Niceville)	47	56
SP24	Private School (Fort Walton)	<=40	<=40
SP26	Kenwood Elementary	<=40	<=40
SP27	Pryor Middle School	<=40	<=40
SP30	Shalimar Elementary School	<=40	<=40

< = less than; ID = identification code; L_{eq} = equivalent sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

1. Schools presented in this table are provided to help understand the noise environment. As such, this table may not include all schools that are affected by noise contours.
2. Indoor L_{eq} is assumed to be 25 decibels less than outdoor L_{eq} due to the noise level reduction provided by the structure with windows closed. Actual outdoor-to-indoor noise level reduction varies from school to school and between locations within individual schools.
3. Previously Valparaiso Elementary School.

Note: Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <=40 dB.

Number of Noise Events Analysis

Table 4-39 provides a list of locations and the number of times during a day that one might experience disruption of communications or activities based on the possible number of noise events exceeding an L_{max} of 50 dB from all flight operations (including non-JSF operations) under the No Action Alternative and under Alternative 2E. For example, an individual living in Eglin's Capehart housing (SP01) would typically experience as many as 159 disruptive events per day under the No Action Alternative, while under Alternative 2E the resident could experience as many as 58 disruptive events each day.

Table 4-39. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2E

Location ID	Location of Interest	No Action Alternative	Alternative 2E
SP01	Eglin Housing (Capehart)	159	58
SP02	Eglin Housing (Ben's Lake)	157	51
SP03	Chapel 2 - building 2574	151	39
SP04	Cherokee Elementary School	156	43
SP05	Child Development Center	155	54
SP06	Oakhill School (closed in 2009)	162	54
SP07	Eglin Hospital	119	24
SP08	Eglin VAQ and Dorms	135	43

Table 4-39. Number of Noise Events above 50 dB L_{max} at Locations of Interest On or Near Eglin Main Base Under Alternative 2E, Cont'd

Location ID	Location of Interest	No Action Alternative	Alternative 2E
SP09	Eglin Chapel 1	127	39
SP10	Joint Strike Fighter Academic Training Facility	168	35
SP11	Lewis Middle School	109	27
SP12	Okaloosa STEMM Center (Valparaiso)	121	55
SP13	First Assembly of God (Valparaiso)	133	65
SP14	New Hope Baptist (Valparaiso)	124	63
SP15	Sovereign Grace Church (Valparaiso)	114	41
SP16	First Baptist Church (Valparaiso)	109	36
SP17	Unitarian Church (Valparaiso)	36	23
SP18	#1 Housing (Valparaiso)	134	62
SP19	#2 Housing (Valparaiso)	90	98
SP20	Edge Elementary School	18	44
SP21	Twin Cities Medical Center	22	49
SP22	Niceville Community Church	113	124
SP23	Private School (Niceville)	121	130
SP24	Private School (Fort Walton)	20	11
SP25	Okaloosa Walton College	10	6
SP26	Kenwood Elementary	16	8
SP27	Pryor Middle School	12	8
SP28	Housing (Fort Walton Beach)	19	11
SP29	Residential property south of Hwy 90 in Crestview	7	18
SP30	Shalimar Elementary School	23	8
SP31	Shalimar Residential	40	16
SP32	Residential Poquito Bayou West Side	26	10
SP33	University of Florida Research and Engineering Education Facility	73	16
SP34	Eglin AFB, building 1 (Air Armament Center HQ)	137	43
SP35	Eglin AFB, building 6 (Air Base Wing HQ)	163	59
SP36	Eglin Law Center (building 2)	168	63
SP37	Saint Sylvester Catholic Church, Gulf Breeze	0	0
SP38	Residential, north of Choctaw	0	0
SP39	Residential, south of Choctaw	1	2
SP40	Okaloosa County Prison	41	117

< = less than; dB = decibels; DNL = day-night average sound level; HQ = Headquarters; Hwy = Florida Highway; ID = identification code; L_{max} = maximum sound level; STEMM = Science, Technology, Engineering, Mathematics, and Medical

4.3.3.6 *Summary*

Table 4-40 summarizes the number of residents potentially affected by aircraft noise in the vicinity of Eglin Main Base under each of the alternatives, comparing these projections with the 2006 AICUZ study historical data. Table 4-41 summarizes the number of acres of land off-base in the vicinity of Eglin Main Base potentially affected by aircraft noise under each of the alternatives, again, comparing these projections with the 2006 AICUZ study historical data. Additional detailed information and supplemental metrics for all alternatives can be found in Appendix E, *Noise*.

Table 4-40. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main

dB Level	2006 AICUZ	Alternative							
		No Action	1A	1I	2A	2B	2C	2D	2E
65–70 dB	1,382	988	1,231	964	879	1,016	1,017	1,015	861
70–75 dB	861	635	1,033	668	488	664	671	670	482
75–80 dB	162	174	549	226	199	216	212	229	198
80–85 dB	2	0	97	0	0	19	17	13	0
>85 dB	0	0	0	0	0	0	0	0	0
TOTAL	**2,407**	**1,797**	**2,910**	**1,858**	**1,566**	**1,915**	**1,917**	**1,927**	**1,541**

AICUZ = Air Installation Compatible Use Zones Study; dB = decibels

Table 4-41. Number of Off-base Acres Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main

dB Level	2006 AICUZ	Alternative							
		No Action	1A	1I	2A	2B	2C	2D	2E
65–70 dB	536	373	436	372	338	397	398	397	331
70–75 dB	241	237	410	244	196	239	240	242	194
75–80 dB	65	83	182	100	80	89	89	93	80
80–85 dB	1	0	45	0	0	8	8	6	0
>85 dB	0	0	0	0	0	0	0	0	0
TOTAL	**843**	**693**	**1,073**	**716**	**614**	**733**	**735**	**738**	**605**

AICUZ = Air Installation Compatible Use Zones Study; dB = decibels

4.3.4 Mitigations

Noise mitigations are designed to reduce noise levels at the source, along the path of noise transmission, or at the receiver (i.e., person, animal, structure). During preparation of the FEIS, many mitigation measures were explored. The Air Force built various measures (listed under "Operational Restrictions" below) into the operations analyzed in the alternatives that will avoid, reduce, or minimize noise impacts. Other potential mitigation measures, such as structural modifications, require substantial funding. Although every effort will be made by the proponent to fund identified mitigations, application of some proposed mitigation measures may be subject to congressional appropriations. Mitigations will be developed and described per the requirements of 32 Code of Federal Regulations (CFR) 989.22(d).

Use of Runways in Areas that are Less Noise-Sensitive

The alternatives described in this SEIS were designed with noise impacts in mind. With the exception of Alternative 1A, all of the alternatives would involve relocating some percentage of the JSF aircraft operations from the existing runways at Eglin Main Base to runways that are surrounded by fewer noise-sensitive land uses. Implementing certain alternatives would result in substantially reduced noise impacts. However, Alternatives 1I, 2A, 2B, and 2C involve construction of new runways, which would require funding far beyond that originally allocated for the beddown of the JSF.

Operational Restrictions

Several operational restrictions were considered during development of the FEIS and SEIS. Certain operational restrictions, such as requiring pilots to use high-speed landing profiles, are not feasible at a training location. Other proposed noise mitigations were found to be infeasible because they would result in conflicts with the North-South Corridor and restricted airspace in the vicinity of the Eglin Main Base runways. Finally, some of the mitigations considered would not have resulted in meaningful reductions in noise or were not within the capabilities of the JSF aircraft (i.e., thrust reversal on landing). Mitigations that have been adopted and incorporated into this SEIS and will be implemented include the following:

- Substantially reduced number of total operations from what was analyzed in the FEIS and the 2010 Draft SEIS
- Reduced the number of flights on RW 01/19 from what was analyzed in the FEIS and the 2010 Draft SEIS
- Use of Practice Instrument Approach Fields to reduce Instrument Landing System (ILS) use of RW 01/19
- Changed the flight profiles for all three F-35 variants
- Changed the flight tracks for Navy and Marines F-35 aircraft
- Adjusted arrival and departure procedures
- Reduced from the FEIS the number of “late night” (between 10:00 PM and 7:00 AM) flights
- Use of flight simulators for some training

As the Air Force, the Joint Program Office (JPO), and other Services gain greater understanding of JSF aircraft performance characteristics, new flight profiles may be designed that reduce overflight noise levels. The Air Force will continue to employ adaptive management to refine JSF flight procedures. Specific aspects of flying at Eglin AFB that will be regularly re-examined include, but are not limited to the following:

- Modify ground tracks used by aircraft to avoid noise-sensitive areas to a greater degree.
- Modify altitude, engine power setting, and airspeed profiles used by the JSF to reduce impacts to noise-sensitive areas.
- Modify the JSF training plan, as more experience is gained with training pilots on the JSF, to minimize any training event requirements that are not absolutely necessary for pilot combat readiness.

- Noise impacts may be reduced with the construction of an ILS and precision approach radar on any newly constructed runways. However, conducting routine instrument approaches to Eglin Main RW 12 would have a significant impact on Air Force Special Operations Command (AFSOC) operations and the usage of Restricted Area R-2915A.

The extent to which these mitigation measures would affect noise impacts would be based on details of how they are executed. For example, if ground tracks were modified, certain areas may be exposed to less noise while other areas would be exposed to increased noise. It is not possible at this time to calculate specific benefits associated with any of the mitigation measures listed above.

The following additional steps will also be part of the mitigation plan for the selected Alternative:

- Identifying the type of monitoring for the action and each mitigation
- Delineating how the monitoring will be executed
- Identifying who will fund and oversee its implementation
- Establishing the process and responsibilities for identifying and making changes to the action or mitigations to influence beneficial results or avoid/reduce adverse ones

Structural Attenuation

All of the alternatives analyzed result in substantial noise-related impacts, including annoyance and interruption of activities such as sleeping, conversation, and listening to the television or radio. Impacts on persons while they are indoors could be mitigated somewhat by implementing noise attenuation measures at homes and other structures.

Noise attenuation measures can be incorporated during construction or added to existing structures. Individual building components (doors, windows, walls, etc.) are rated with a sound transmission class (STC) based on how well the product or assembly blocks sound under a standardized set of conditions. Increasing the overall exterior-to-interior NLR is accomplished by replacing components with low STCs with components with higher STCs. For example, single-paned windows normally have an STC rating of between 25 and 28. Window assemblies specifically designed to block sound have STC ratings into the 50s. It is of critical importance to recognize that all building components must work together in a balanced manner to reduce noise intrusion. In other words, installation of windows with high STC will have little effect on NLR if the doors have a very low STC. Building requirements to achieve a specific NLR include requirements for exterior walls, windows, doors, roof-ceiling assembly, floors, foundations, ventilation, and any other wall penetrations. The average NLR provided by a typical American home located in a warm climate is 24 dB if the windows are closed and 12 dB if the windows are open (USEPA, 1974). Because houses are often insulated better today than they were in 1974, when the USEPA reported the listed NLR values, actual average NLR is likely to be slightly higher. Special noise attenuation measures can provide 30 to 35 dB of NLR.

In areas with mild climates, such as Florida, certain structures may have a lower exterior-interior NLR than in other parts of the country. When the weather is warm, windows are more likely to be left open. Also, construction elements that are designed to improve exterior-to-interior airflow, such as louvered windows, typically have low STC. Ultimately, structural attenuation is only effective in mitigating aircraft overflight noise when people are indoors, which is frequently not the case in the state of Florida.

Planning for a structural noise attenuation project requires consideration of a number of location-specific and structure-specific factors, including interior NLR goals, the type of materials used in original construction (for existing structures), and orientation of the structure relative to flight paths (Wyle, 2005). Qualified acoustical professionals should be involved in project design, execution, and testing in order to achieve desired results.

Per DoD recommendations, many noise-sensitive land uses are never considered to be compatible at noise levels greater than 75 dB DNL (DoD, 2011). Also, at extremely high exterior noise levels, reaching the USEPA-designated interior noise level goal of less than 45 dB DNL would typically be prohibitively expensive or would require structural modifications that may detract from the appearance or impede the function of the structure. Nevertheless, reduction of interior noise levels in structures exposed to extremely high aircraft noise would provide some relief from aircraft noise impacts.

All future facilities should be sited in compatible noise zones or should incorporate adequate sound attenuation in the design as needed. The Air Force could request Congressional authority to provide sound attenuation for existing facilities that are incompatible with the land use compatibility guidelines (as stated in Appendix J, *Land Use*). However, this will not address noise impacts on people's outside activities.

Noise Receiver Modifications

Potential mitigations for developed areas on-base that are adversely affected by noise include:

- Relocating the impacted activity and altering the structure to accommodate a less sensitive use.

- Relocating the structure and the activity to a site with acceptable noise environment.
- Abandoning the structure and relocating the activity elsewhere.

Individual sensitive land uses could be relocated on a case-by-case basis if they could not be adequately attenuated. Because it is fiscally infeasible to relocate the major portion of the cantonment, which lies in a high noise zone, the Air Force would have to rely primarily on operational changes or sound attenuation.

The Air Force could request funds to acquire property interests from willing sellers after more refined noise exposure contours are developed (e.g., after all 59 F-35 aircraft have begun operating at Eglin AFB and a new AICUZ study is finalized).

Advanced hearing protection for maintainers and aircraft support personnel could be purchased as needed.

Runway Modifications

During the alternative development process, two scenarios were evaluated which sought to mitigate noise impacts by modifying RW 19. The two mitigation scenarios are defined as follows:

- Scenario 1F, Raise RW 19 Initial Approach Pattern: This scenario would increase the glideslope on approach to RW 19 to 3.0 degrees. The existing glideslope is 2.5 degrees, although at the approach fix CHLOE 5 nautical miles from the RW 19 threshold, aircraft arrivals must be at a minimum altitude of 1,500 feet above ground level (effectively equivalent to an approximate 2.8-degree glideslope).
- Scenario 1G, RW 19 Displaced Threshold: The threshold on RW 19 would be displaced 1,000 feet south, effectively reducing the length of the runway from 10,000 feet to 9,000 feet.

In a memo dated June 15, 2010, noise analysts at Wyle Laboratories said that, per their professional judgment, implementation of mitigation Scenario 1F and 1G, individually or combined, would not provide a significant reduction in noise exposure as compared with Scenario 1A. The memo stated that the cumulative impacts of these two mitigation scenarios "…do not notably change the size and shape of the noise contour as compared to Scenario 1A (59 PAA)" (Wyle, 2010).

4.4 LAND USE

For purposes of this SEIS analysis, land use impacts are those associated with increases in noise (due to an increase in air operations and the introduction of a new aircraft, the F-35), as well as land uses impacted by new development (such as runways, ramps, and facilities). These activities would produce changes in the existing noise environment, which could pose land use compatibility issues, including changes to land management, land use, or land ownership.

Tyndall AFB

As indicated in Section 4.3, DNL noise contours indicate that the addition of the F-35 operations associated with the JSF IJTS with those operations associated with the *F-22 EA* would be less than 1 dB difference. Therefore, the impacts would be the same as those stated in the *F-22 EA*. A summary of those impacts indicated that noise levels would affect additional acres off-base with noise levels between 65 and 74 dB DNL. Noise levels of 75 dB DNL and greater are isolated to Tyndall AFB or open water areas. The areas newly affected by 65–74 dB DNL include residential, commercial, and mixed-use land uses in the city of Parker, the city of Callaway, and unincorporated Bay County. These land uses are compatible with noise levels less than 75 dB DNL with the incorporation of noise attenuation. Individuals exposed to these aircraft noise levels may experience annoyance; however, changes in land use are not expected. Noise levels in the primary use airspace would be comparable to baseline noise levels and would not be expected to affect land uses, recreation activities, or special land use areas. Therefore, no significant impacts are anticipated to land use at Tyndall AFB as a result of F-35 JSF IJTS operations.

4.4.1 Alternative 1 – Eglin Main Base

4.4.1.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Construction

Construction-related impacts on land use associated with Alternative 1A were previously analyzed in the FEIS, and all construction was authorized by the February 2009 Record of Decision (ROD).

Flight Operations

Military Land Use

Figure 4-31 shows the existing land use for Eglin Main Base and the JSF noise contours for Alternative 1A. Approximately 8,183 acres of Eglin Main Base property could be exposed to noise levels greater than 65 dB DNL. The affected area and impacts would be similar to those described for the No Action Alternative, except the affected area is slightly greater, since the flight constraints concerning the use of RW 01/19 would not exist, and the runway would be used for training activities. Noise exposures would be greater on the east side of the airfield under Alternative 1A.

Impacts at Duke Field and Choctaw Field from JSF air operations would be identical to those described for the No Action Alternative (Figure 3-9 and Figure 3-10, respectively) and would not adversely impact existing on-base land use compatibility.

The impacted on-base area surrounding Eglin Main Base, Duke Field, and Choctaw Field is part of the interstitial area of Eglin Range used for military training and is open to the public for recreational activities. The increase in noise exposure above 65 dB DNL would not adversely impact land use or compatibility issues.

Community Land Use

Implementing Alternative 1A would also impact land use compatibility in affected areas off Eglin AFB (Figure 4-32), resulting from the increased noise from JSF air operations. The affected areas would be similar to those described for the No Action Alternative. However, larger areas of Valparaiso and Niceville would be impacted because of the heavier use of the Eglin Main Base airfield. The affected areas and the associated noise contours are shown previously in Figure 3-12 and Figure 3-13.

The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 1,070, 0.08, and 2,127 acres, respectively (Table 4-42).

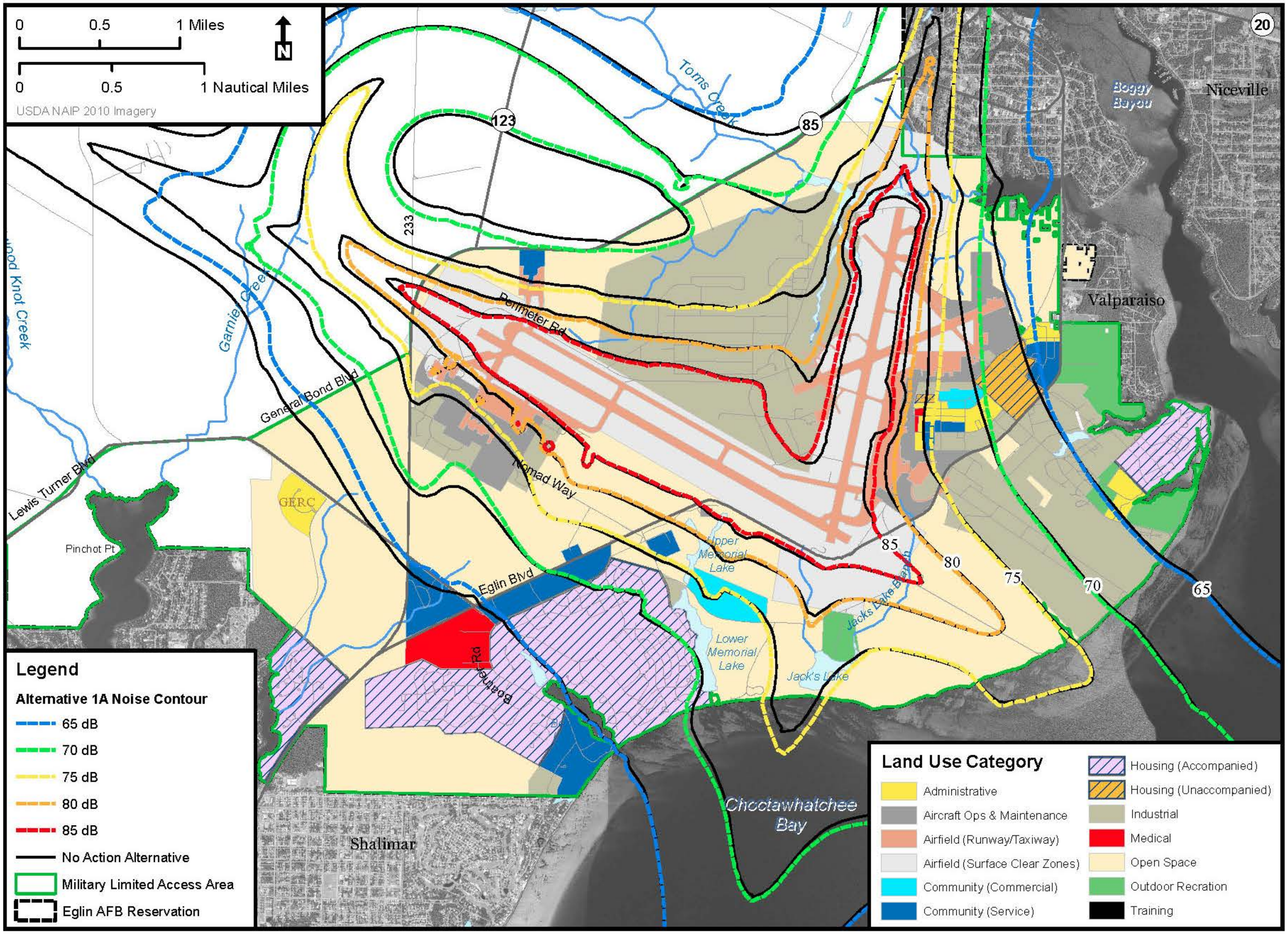


Figure 4-31. On-base Land Use – Alternative 1A (Preferred Alternative) (Eglin)

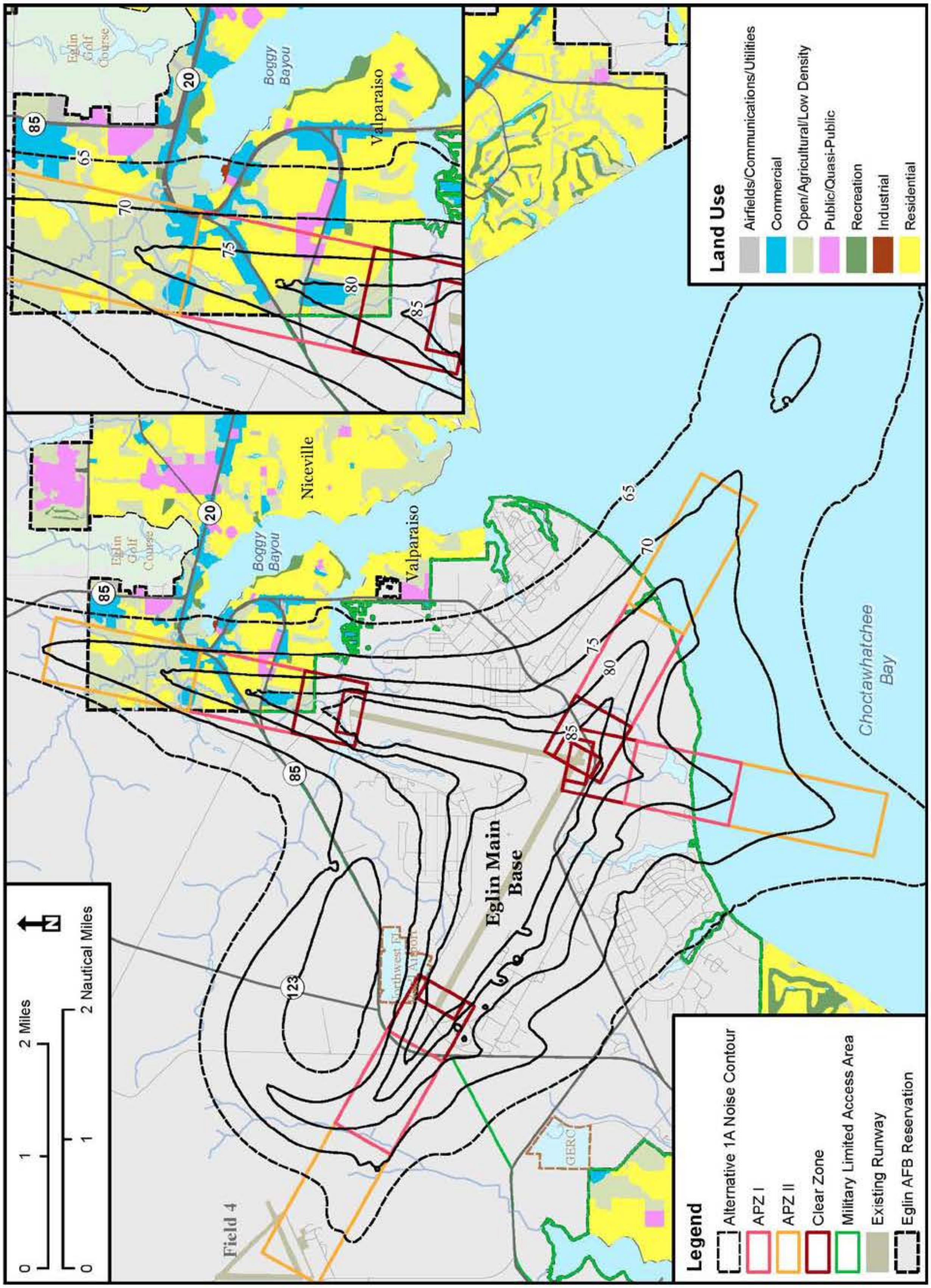


Figure 4-32. Land Use Off-base (Eglin) – Alternative 1A (Preferred Alternative)

Table 4-42. Alternative 1A (Preferred Alternative) – Eglin Main Off-base Land Use

	Number of Acres Impacted											
LAND USE CATEGORY	EGLIN MAIN 65–74 dBA		EGLIN MAIN 75+ dBA		DUKE FIELD 65–74 dBA		DUKE FIELD 75+ dBA		CHOCTAW FIELD 65–74 dBA		CHOCTAW FIELD 75+ dBA	
Residential	327.6	↑92.1	87.9	↑75	0.01	0	0	0	-	-	-	-
Commercial	108	↑49.8	39.3	↑13	0	0	0	0	-	-	-	-
Industrial	9.7	↓0.3	5.3	↑3.5	0	0	0	0	-	-	-	-
Open/Agricultural/ Low-Density	369.8	↑79.2	87.6	↑54.9	0.07	0	0	0	2,069.4	↓7.2	58	↑0.6
Public/Quasi-Public	28.38	↑12.68	2.3	↑2.3	0	0	0	0	-	-	-	-
Recreational	4.4	↑3.1	0	0	0	0	0	0	-	-	-	-
TOTAL Land Area	**847.88**	**↑236.58**	**222.4**	**↑148.7**	**0.08**	**0**	**0**	**0**	**2,069.4**	**↓7.2**	**58**	**↑0.6**

↑ ↓ Amount of increase/decrease/no change from No Action Alternative

Note: Land use estimates were made based on 2010 Northwest Florida Water Management District land use data (Florida Department of Environmental Protection [FDEP], 2010) and do not include water areas.

4.4.1.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Construction

Approximately 2,127 acres of on-base land use would be directly impacted by the new runway construction under Alternative 1I (Figure 4-33). Existing land use at Duke Field would not change. Land uses that would be directly impacted include open space, roads/highways, and utilities (electrical transmission lines, wastewater effluent holding ponds, and spray fields).

Construction of the new runway would also eliminate public access and outdoor recreation, including hunting, in the affected area. Approximately 1,793 acres (206 acres on Management Unit [MU] 5 and 1,547 acres in 6A) would be removed from Public Access/Recreational Use (Figure 4-33). This would decrease the total acreage available for public access and outdoor recreation by about 7 percent in MU 5 and 3 percent on MU 6A. The change in land use would not be adverse because it would be compatible with the existing land uses nearby on Eglin Main Base. The change would also not significantly reduce the amount of area open for public access and outdoor recreation within the affected MUs and the remaining portion of the Eglin Range.

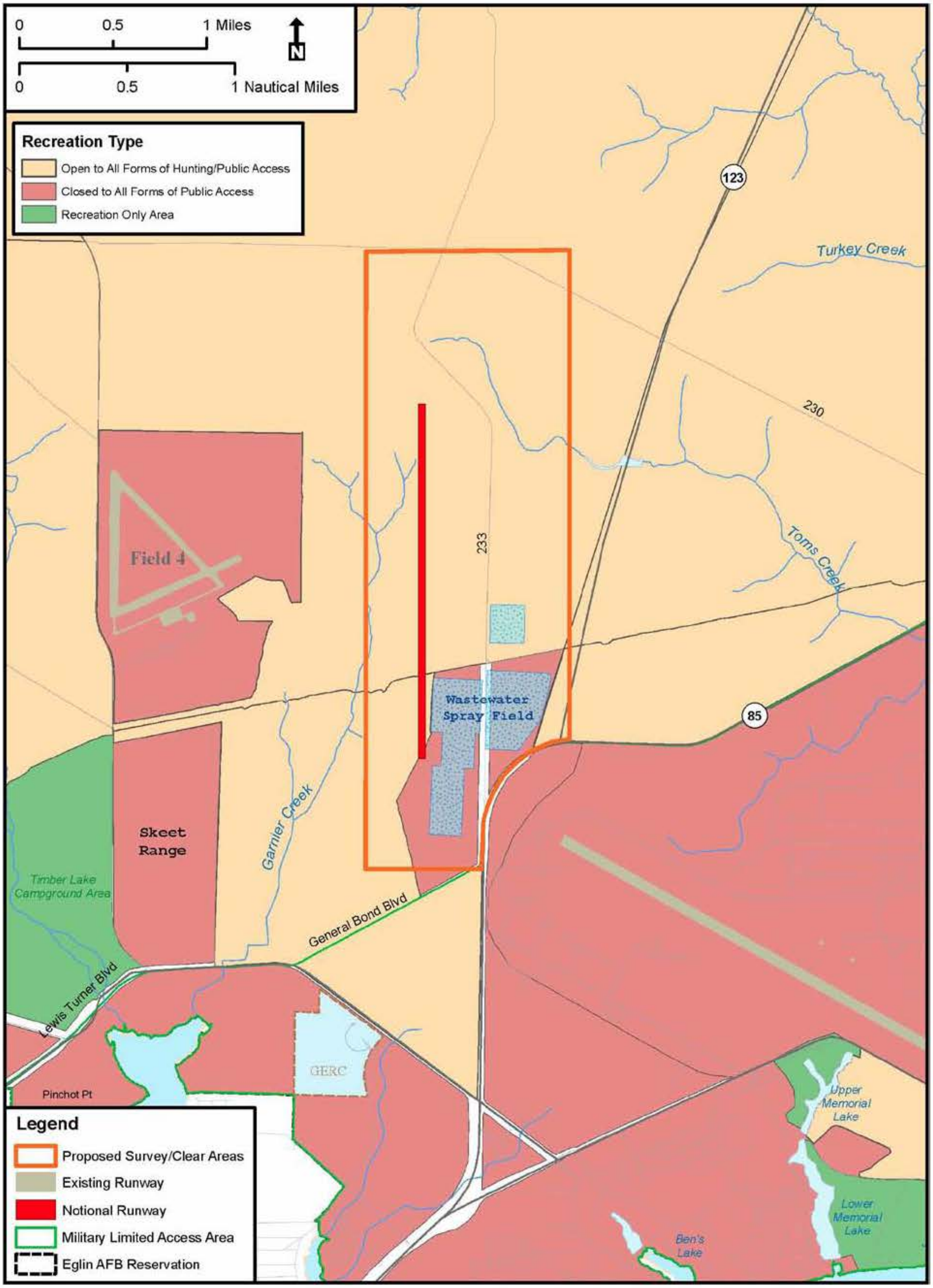


Figure 4-33. Recreation Units On-base (Eglin) – Alternative 1I

The Accident Potential Zone (APZ) I and II areas associated with the new runway would also affect land use. Existing on-base land uses within the new APZ I area include open space and administrative. Within the APZ II area, the existing on-base land use includes open space, community (Service), and housing (accompanied). Acceptable uses in the APZ II include those of APZ I, as well as low-density, single-family residential (one dwelling per acre) and personal and business services and commercial/retail trade uses of low intensity or scale of operation. High-density functions such as multistory buildings, places of assembly (e.g., theaters, churches, schools, restaurants), and high-density office uses are not considered appropriate (U.S. Air Force, 2006b).

Construction-related impacts on land use for the JSF IJTS support facilities on Eglin Main Base were previously analyzed in the FEIS, and all construction was authorized by the February 2009 ROD.

Flight Operations

Military Land Use

Figure 4-34 shows the existing land use for Eglin Main Base and the JSF noise contours for Alternative 1I. Approximately 7,951 acres of Eglin Main Base property could be exposed to noise levels greater than 65 dB DNL.

The on-base noise exposures at Duke Field would be identical to those described for Alternative 1A.

Noise exposures at Choctaw Field would be very similar to those described for the No Action Alternative and would not adversely impact existing on-base land use compatibility.

The impacted on-base area surrounding Eglin Main Base, Duke Field, and Choctaw Field is part of the interstitial area of Eglin Range used for military training and is open to the public for recreational activities. The increase in noise exposure above 65 dB DNL would not adversely impact land use or compatibility issues.

Community Land Use

Implementing Alternative 1I would also impact land use compatibility in affected areas off Eglin AFB, resulting from the increased noise from JSF air operations. The affected areas would be similar to those described for Alternative 1A. However, smaller areas of Valparaiso and Niceville would be impacted because of the heavier use of the new runway. The affected areas and the noise contours are shown in Figure 4-35.

Figure 4-34. On-base Land Use – Alternative 1I (Eglin)

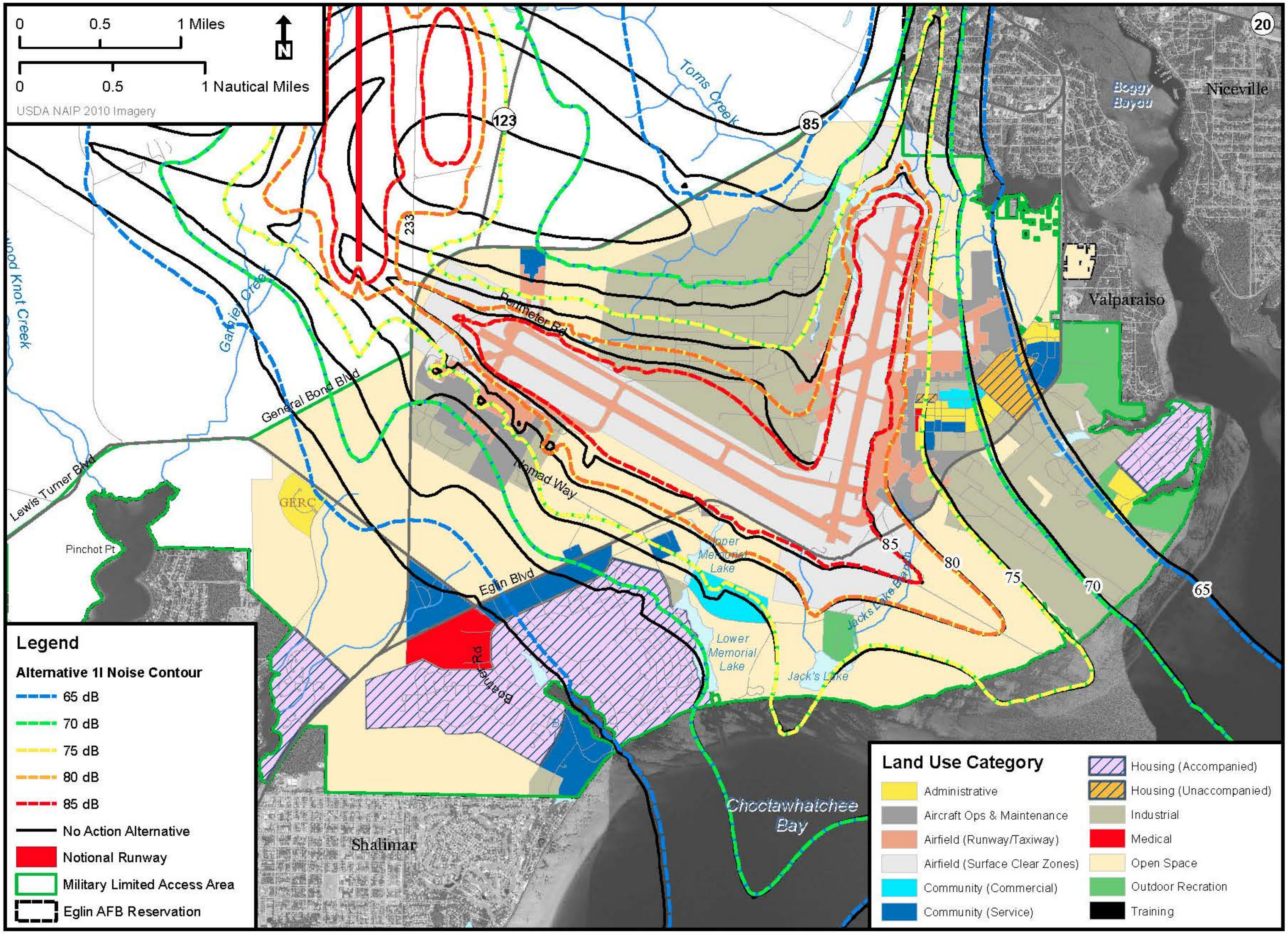
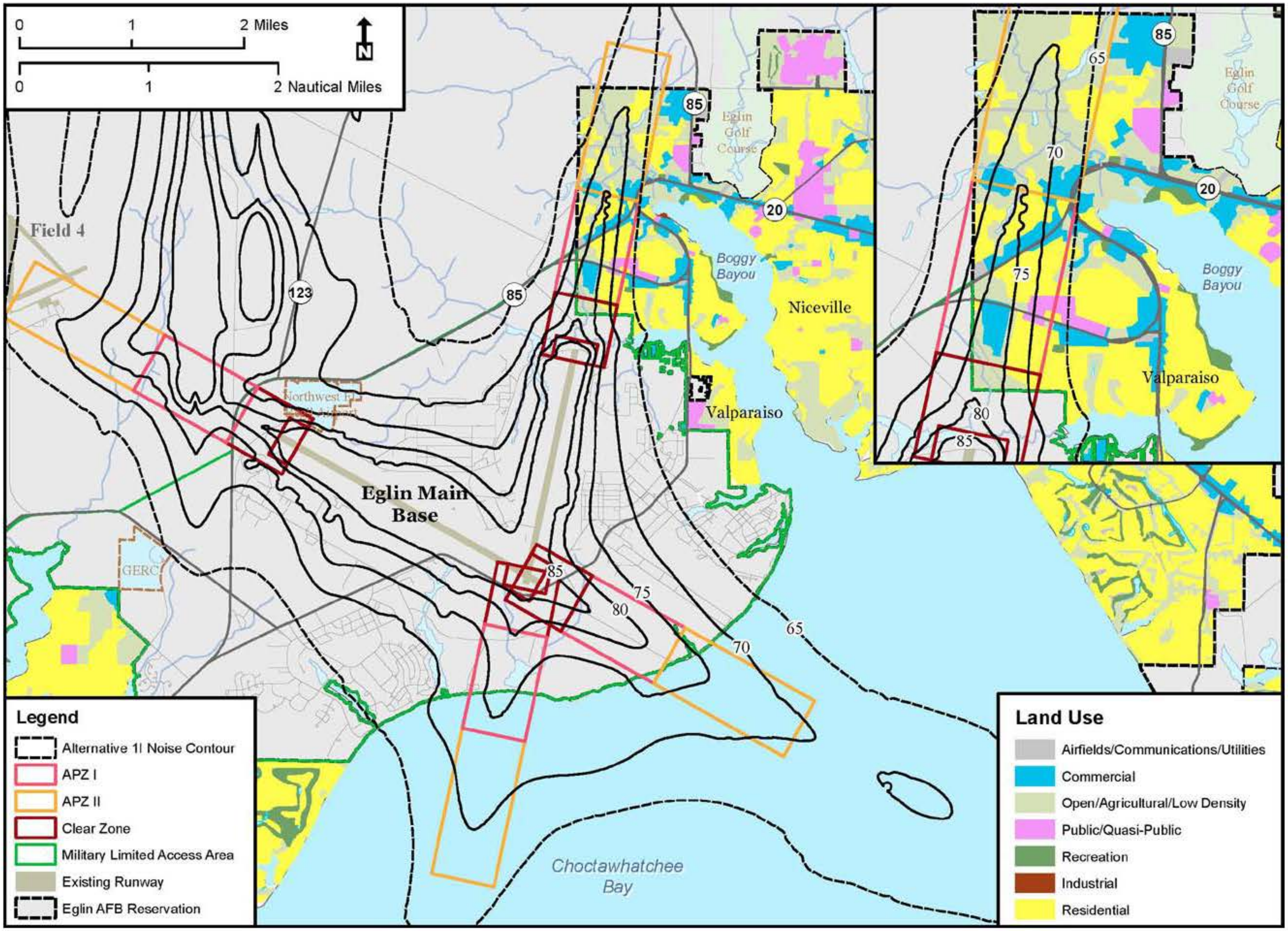


Figure 4-35. Land Use Off-base (Eglin) – Alternative 1I



The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 699, 0.8, and 2,128 acres, respectively (Table 4-43).

Table 4-43. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 1I

	Number of Acres Impacted											
	EGLIN MAIN				DUKE FIELD				CHOCTAW FIELD			
LAND USE CATEGORY	65–74 dBA		75+ dBA		65–74 dBA		75+ dBA		65–74 dBA		75+ dBA	
Residential	236	↑ 0.5	20.5	↑ 7.6	0.01	0	0	0	-	-	-	-
Commercial	61.6	↑ 3.4	27.8	↑ 1.5	0	0	0	0	-	-	-	-
Industrial	9.99	↓ 0.01	2.1	↑ 0.3	0	0	0	0	-	-	-	-
Open/Agricultural/ Low-Density	278.5	↓ 12.1	43.3	↑ 10.6	0.07	0	0	0	2,069.3	↓ 7.3	58.9	↑ 1.5
Public/Quasi-Public	18	↑ 2.3	0	0	0	0	0	0	-	-	-	-
Recreational	1.5	0.2	0	0	0	0	0	0	-	-	-	-
TOTAL Land Area	**605.59**	**↓ 5.71**	**93.7**	**↑ 20**	**0.08**	**0**	**0**	**0**	**2,069.3**	**↓ 7.3**	**58.9**	**↑ 1.5**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Note: Land use estimates were made based on 2010 Northwest Florida Water Management District land use data (Florida Department of Environmental Protection [FDEP], 2010) and do not include water areas.

4.4.2 Alternative 2 – Duke Field

4.4.2.1 *Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field*

Construction

Approximately 3,750 acres of on-base land use would be directly impacted by the construction activities under Alternative 2A (Figure 4-36).

Construction of the new runway and Landing Helicopter Amphibious (LHA) deck would eliminate public access and outdoor recreation, including hunting, in the affected area. A portion of the area is also occasionally used for military training exercises. Approximately 3,077 acres (164 acres on MU 7, 265 acres in 7A, 1,092 acres in 9, and 1,556 acres in 9A) would be removed from Public Access/Recreational Use. This would decrease the total acreage available for public access and outdoor recreation on MU 7 by about 0.8 percent, 13 percent on 7A, 12 percent on MU 9, and 24 percent on MU 9A. The existing game check station located at the intersection of Range Road 213 and Range Road 231 would also need to be relocated.

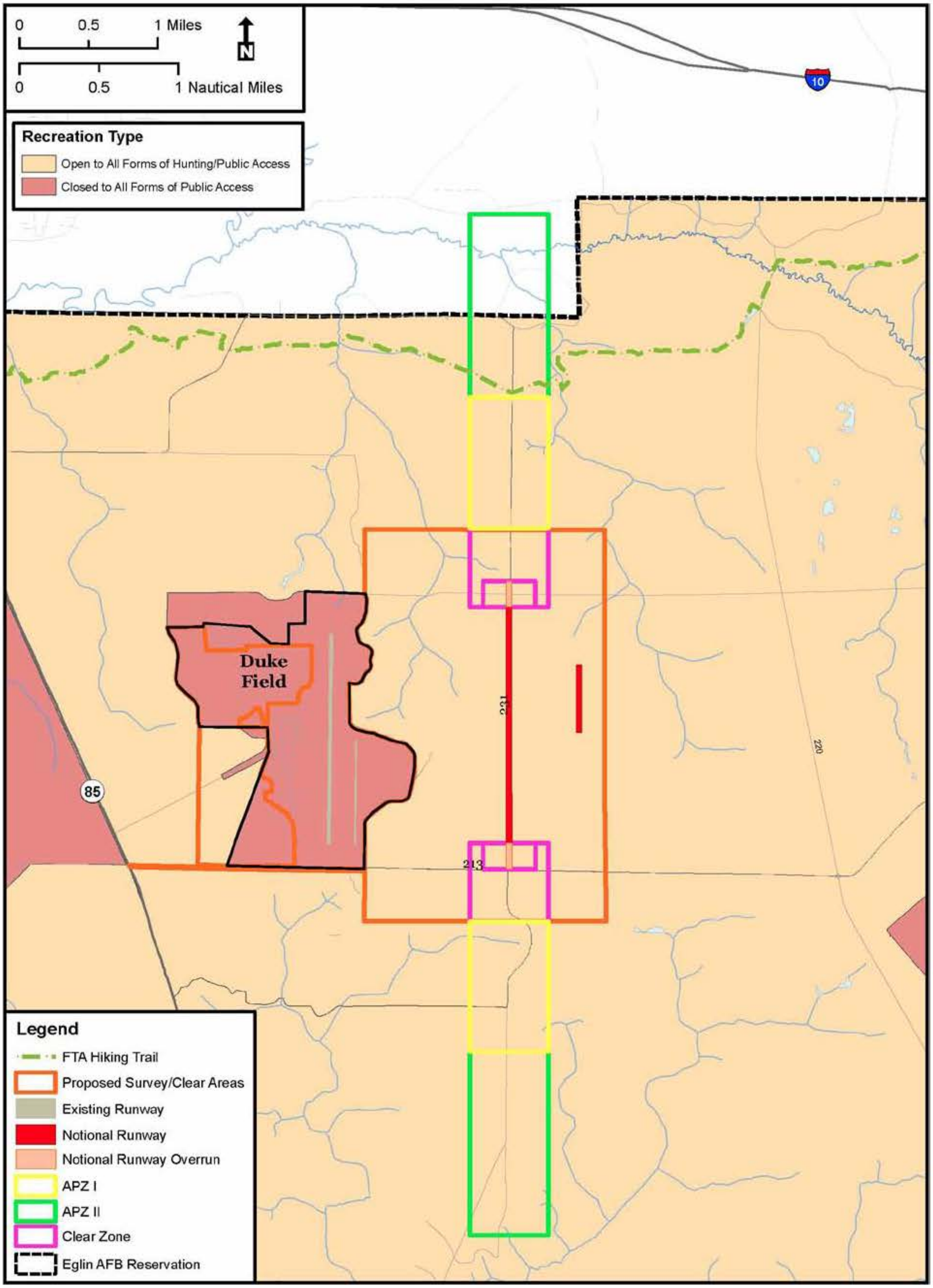


Figure 4-36. Recreation Units On-base (Duke Field) – Alternatives 2A, 2B, and 2C

The change in land use would not be adverse because it would be compatible with the existing land uses nearby on Eglin Main Base. The change would also not significantly reduce the amount of area open for public access and outdoor recreation within the affected MUs and the remaining portion of the Eglin Range. Construction of the new runway would also eliminate a section of Range Road 231 between Range Road 213 and Range Road 454. Range Road 454 would also be impacted where the new runway would cross. The affected roadways would be closed in the affected areas and may or may not be rerouted.

Construction of additional facilities to support the JSF beddown at Duke Field would be conducted within a 672-acre area directly adjacent to the west side of the Duke Field cantonment. Approximately 226 acres of undeveloped open space on MU 9A would be removed from Public Access/Recreational Use, in addition to the 1,556 acres that would be removed from the cleared area proposed for construction of the new runway and LHA (Figure 4-37). This would decrease the total acreage available for public access and outdoor recreation on MU 9A by about 27 percent. Additionally, the northern portion of the 672 area is located within the quantity-distance arc of the existing munitions storage facilities. Existing land use at Choctaw Field would not change under this Alternative.

Construction-related impacts on land use for the other IJTS support facilities that would be located at Eglin Main Base were previously analyzed in the FEIS, and all construction was authorized by the February 2009 ROD.

Flight Operations

Military Land Use

Figure 4-37 shows the existing land use for Duke Field and the JSF noise contours for Alternative 2A. Almost the entire developed area of Duke Field could be exposed to noise levels of 75 dB DNL or greater.

Noise exposures at Choctaw Field would be similar to those described for the No Action Alternative and would not adversely impact existing on-base land use compatibility.

The impacted on-base area surrounding Duke Field and Choctaw Field is part of the interstitial area of Eglin Range used for military training and is open to the public for recreational activities. The increase in noise exposure above 65 dB DNL would not adversely impact land use or compatibility issues.

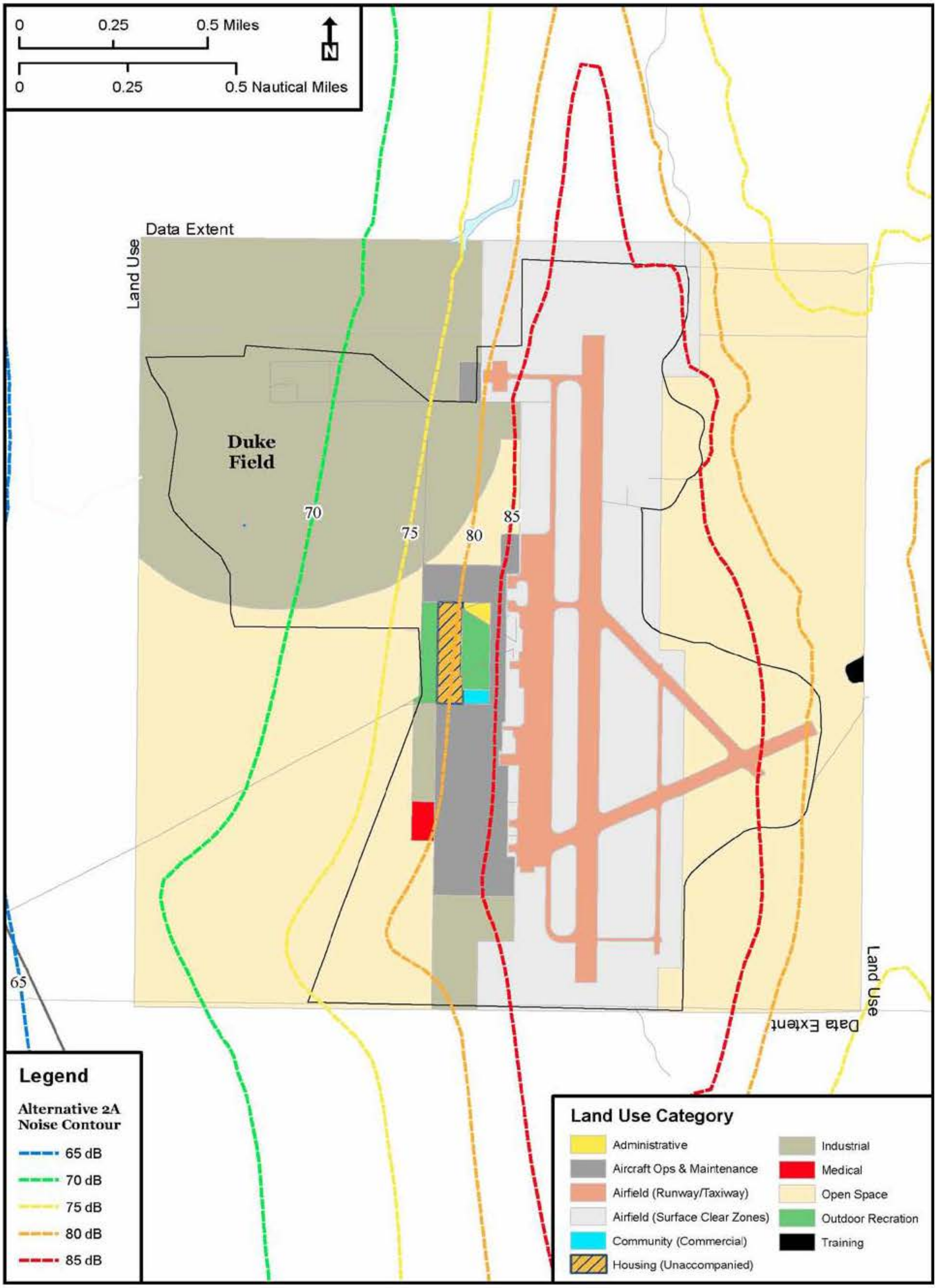


Figure 4-37. On-base Land Use – Alternative 2A (Duke Field)

Community Land Use

Implementing Alternative 2A would also impact land use compatibility in affected areas north of Duke Field and adjacent to Choctaw Field, resulting from the increased noise from JSF air operations. The affected areas and the noise contours are shown in Figure 4-38.

The total off-base area in the vicinity of Duke Field and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 912 and 2,348 acres, respectively (Table 4-44). No JSF operations would occur at Eglin Main Base under Alternative 2A; however, acreages impacted by non-JSF operations are included in Table 4-44 as a reference.

Table 4-44. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2A

	Number of Acres Impacted											
LAND USE CATEGORY	EGLIN MAIN				DUKE FIELD				CHOCTAW FIELD			
	65–74 dBA		75+ dBA		65–74 dBA		75+ dBA		65–74 dBA		75+ dBA	
Residential	170.5	↓ 65	17.9	↑ 5	4	↑ 3.99	0	0	-	-	-	-
Commercial	46.2	↓ 12.1	9.2	↓ 17.1	0	0	0	0	-	-	-	-
Industrial	9.2	↓ 0.82	19	↑ 17.2	119	↓ 119	3	↑ 3	-	-	-	-
Open/Agricultural/ Low-Density	291.4	↑ 0.77	34.3	↑ 1.6	690.8	↑ 690.73	0	0	2,222	↑ 145.4	126	↑ 68.6
Public/Quasi-Public	4.5	↓ 11.2	0	0	95.2	↑ 95.2	0	0	-	-	-	-
Recreational	0.62	↓ 0.68	0	0	0	0	0	0	-	-	-	-
TOTAL Land Area	**522.35**	**↓ 88.95**	**80.4**	**↑ 6.6**	**909**	**↑ 908.92**	**3**	**↑ 3**	**2,222**	**↑ 145.4**	**126**	**↑ 68.6**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Notes:
Land use estimates were made based on 2010 Northwest Florida Water Management District land use data (Florida Department of Environmental Protection [FDEP], 2010) and do not include water areas.
No JSF operations would occur at Eglin Main Base under Alternative 2A; however, acreages impacted by non-JSF operations are included in the table above as a reference.

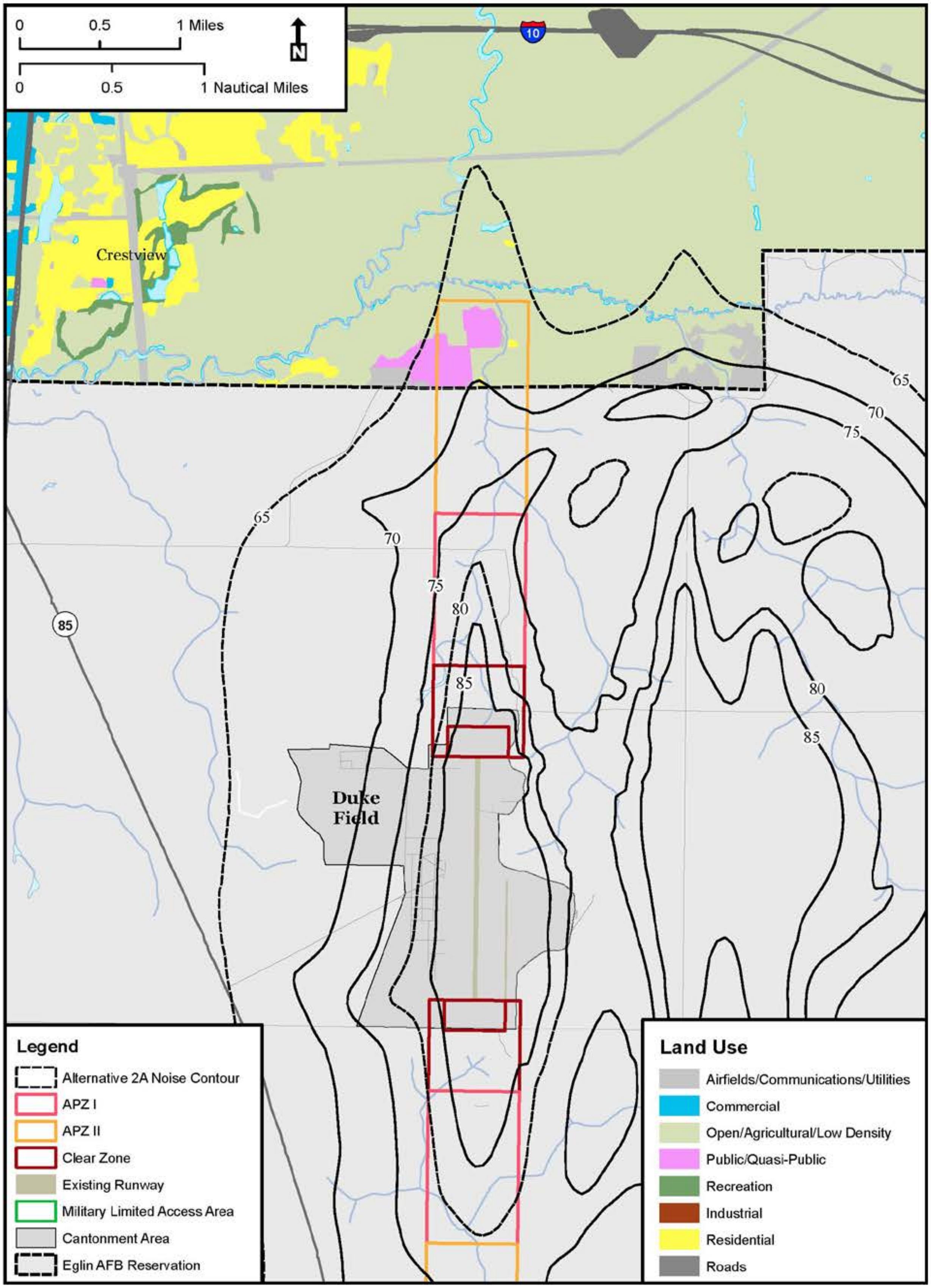


Figure 4-38. Land Use Off-base (Duke Field) – Alternative 2A

4.4.2.2 *Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12*

Construction

Construction-related impacts on land use would be identical to those described for Alternative 2A. Existing land use at Eglin Main RW 12 would not change.

Flight Operations

Military Land Use

Figure 4-39 shows the existing land use for Duke Field and the JSF noise contours for Alternative 2B. On-base impacts from JSF air operations at Duke Field would be almost identical to those under Alternative 2A.

Figure 4-40 shows the existing land use for Eglin Main Base and the JSF noise contours for Alternative 2B. Approximately 7,180 acres of Eglin Main Base property could be exposed to noise levels greater than 65 dB DNL.

The impacted on-base area surrounding Duke Field and Eglin Main Base is part of the interstitial area of Eglin Range used for military training and is open to the public for recreational activities. The increase in noise exposure above 65 dB DNL would not adversely impact land use or compatibility issues.

Community Land Use

Implementing Alternative 2B would also impact land use compatibility in affected areas off Eglin AFB, north of Duke Field, resulting from the increased noise from JSF air operations. The affected areas and the noise contours are shown in Figure 4-41.

Similar to Alternative 1A, JSF air operations at Eglin Main Base would primarily affect off-base areas in Valparaiso and Niceville. The affected areas and the noise contours are shown in Figure 4-42.

The total off-base land area in the vicinity of Eglin Main Base and Duke Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 718 and 887 acres, respectively (Table 4-45). No JSF operations would occur at Choctaw Field; however, acreages impacted by non–JSF operations are included in Table 4-45 as a reference.

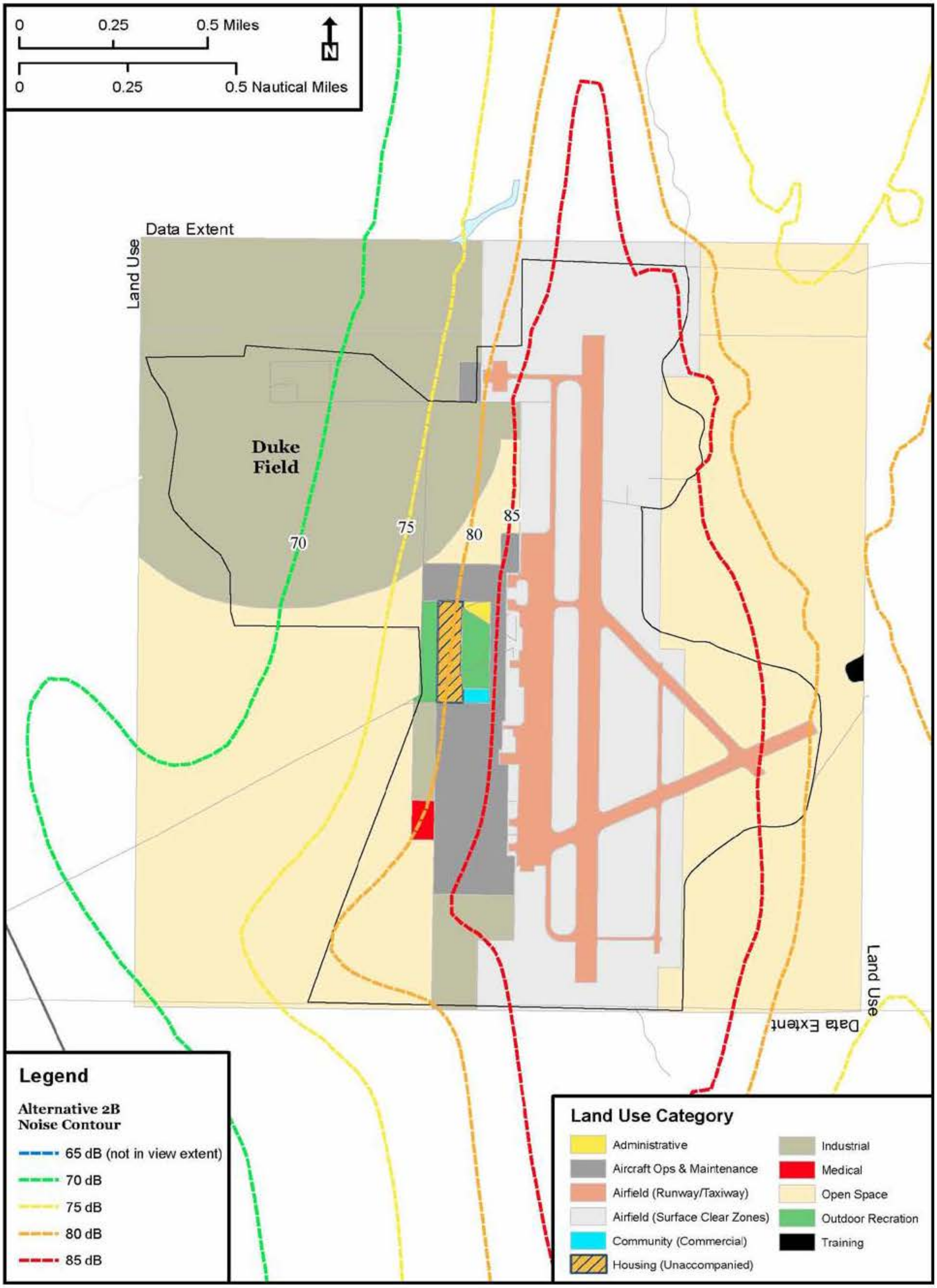


Figure 4-39. On-base Land Use – Alternative 2B (Duke Field)

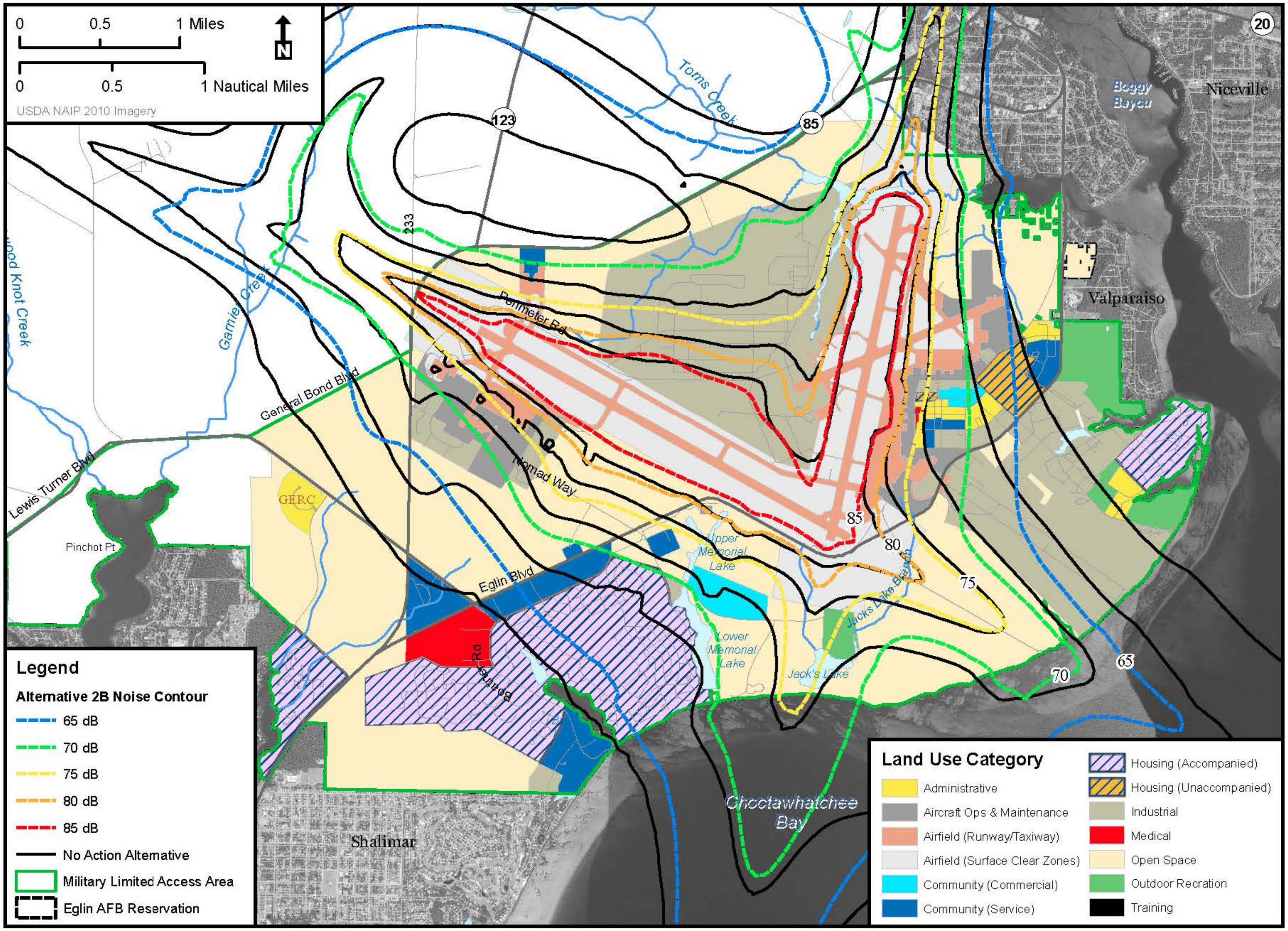


Figure 4-40. On-base Land Use – Alternative 2B (Eglin)

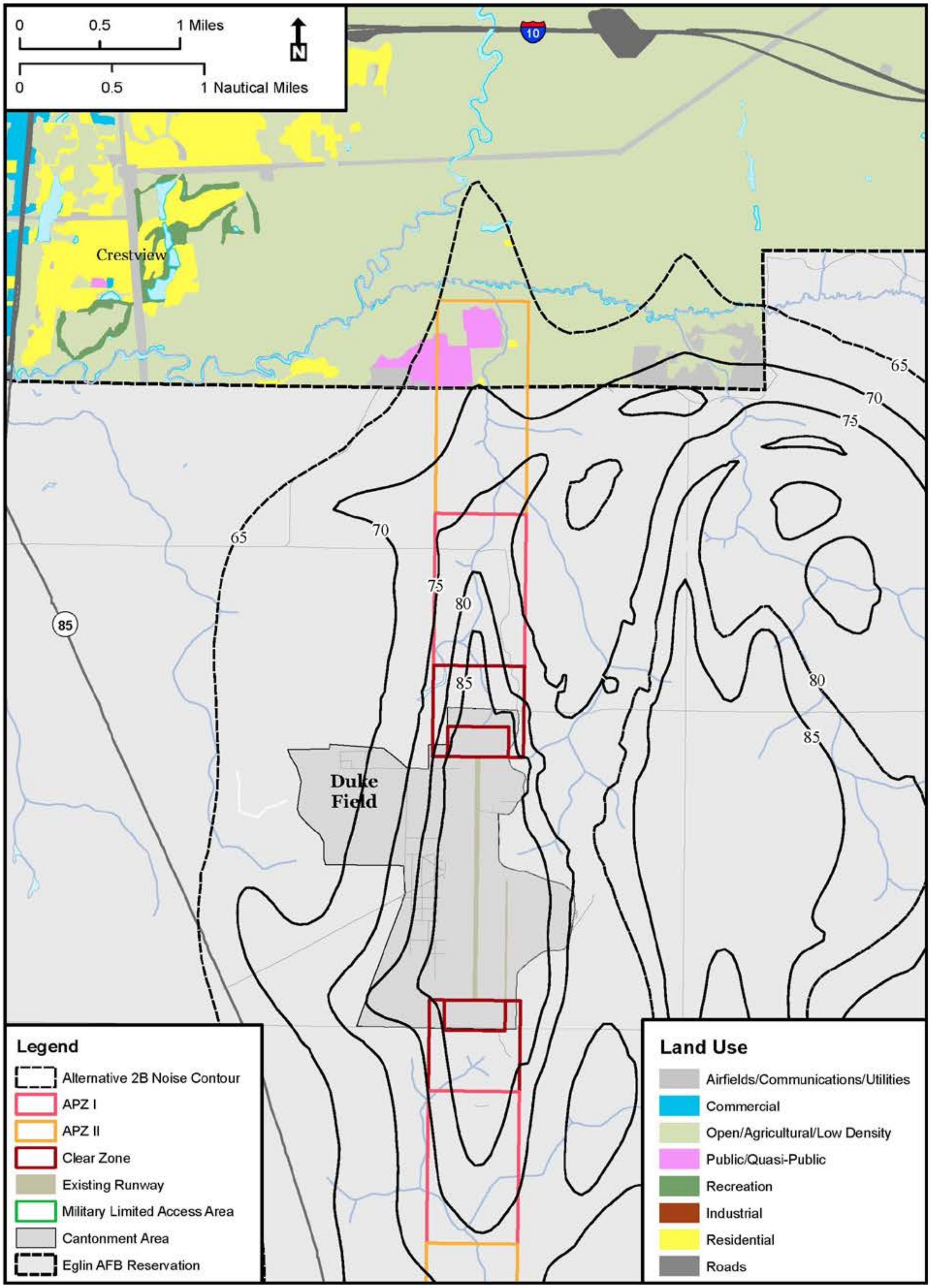


Figure 4-41. Land Use Off-base (Duke Field) – Alternative 2B

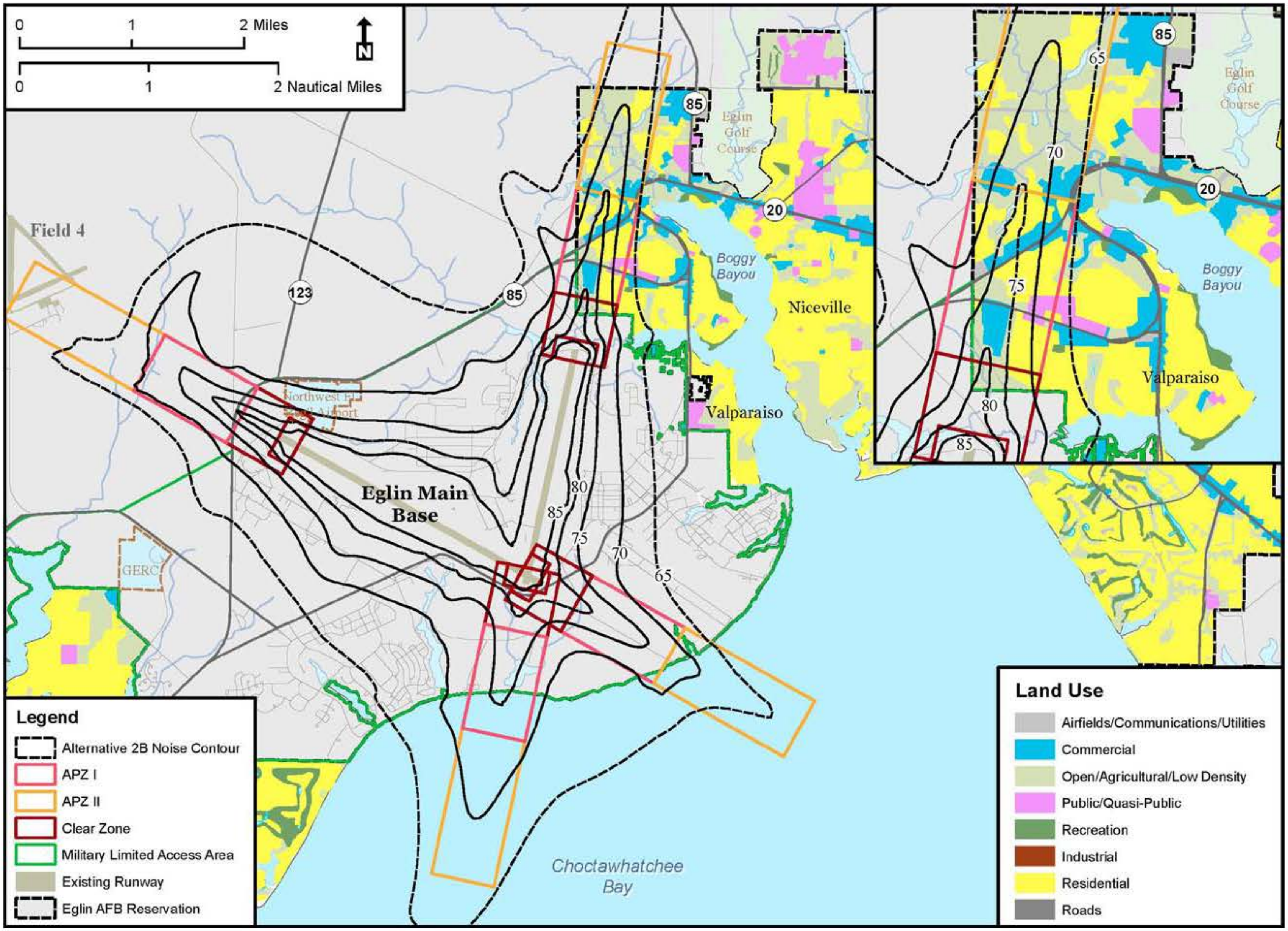


Figure 4-42. Land Use Off-base (Eglin) – Alternative 2B

Table 4-45. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2B

	Number of Acres Impacted											
LAND USE CATEGORY	EGLIN MAIN				DUKE FIELD				CHOCTAW FIELD			
	65–74 dBA		75+ dBA		65–74 dBA		75+ dBA		65–74 dBA		75+ dBA	
Residential	246.6	↑ 11.1	21.6	↑ 8.7	3.8	↑ 3.79	0	0	0	↓ 65	0	↓ 13
Commercial	64	↑ 5.8	27.4	↑ 1.1	0	0	0	0	0	↓ 58.2	0	↓ 26.3
Industrial	9.8	↓ 0.2	2.5	↑ 0.7	120.1	↑ 120.1	0.4	↑ 0.4	0	↓ 10	0	↓ 1.8
Open/Agricultural/ Low-Density	280.5	↓ 10.1	45.5	↑ 12.8	763.1	↑ 763.03	0	0	88.8	↓ 201.84	0	↓ 32.7
Public/Quasi-Public	19	↑ 3.3	0	0	0	0	0	0	0	↓ 15.7	0	0
Recreational	1.57	↑ 0.27	0	0	0	0	0	0	0	↓ 1.3	0	0
TOTAL Land Area	621.47	↑ 10.17	97	↑ 23.3	887	↑ 886.92	0.4	↑ 0.4	88.76	↓ 522.54	0.0	↓ 73.7

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Notes:
Land use estimates were made based on 2010 NWFWMD land use data (Florida Department of Environmental Protection [FDEP], 2010) and do not include water areas.
No JSF operations would occur at Choctaw Field under Alternative 2B; however, acreages impacted by non-JSF operations are included in the table above as a reference

4.4.2.3 *Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field*

Construction

Construction-related impacts on land use would be identical to those described for Alternative 2A. Existing land use at Eglin Main RW 12 and Choctaw Field would not change.

Flight Operations

Military Land Use

Figure 4-43 shows the existing land use for Duke Field and the JSF noise contours for Alternative 2C. On-base impacts from JSF air operations at Duke Field would be almost identical to those under Alternative 2A.

Figure 4-44 shows the existing land use for Eglin Main Base and the JSF noise contours for Alternative 2C. Approximately 7,071 acres of Eglin Main Base property could be exposed to noise levels greater than 65 dB DNL.

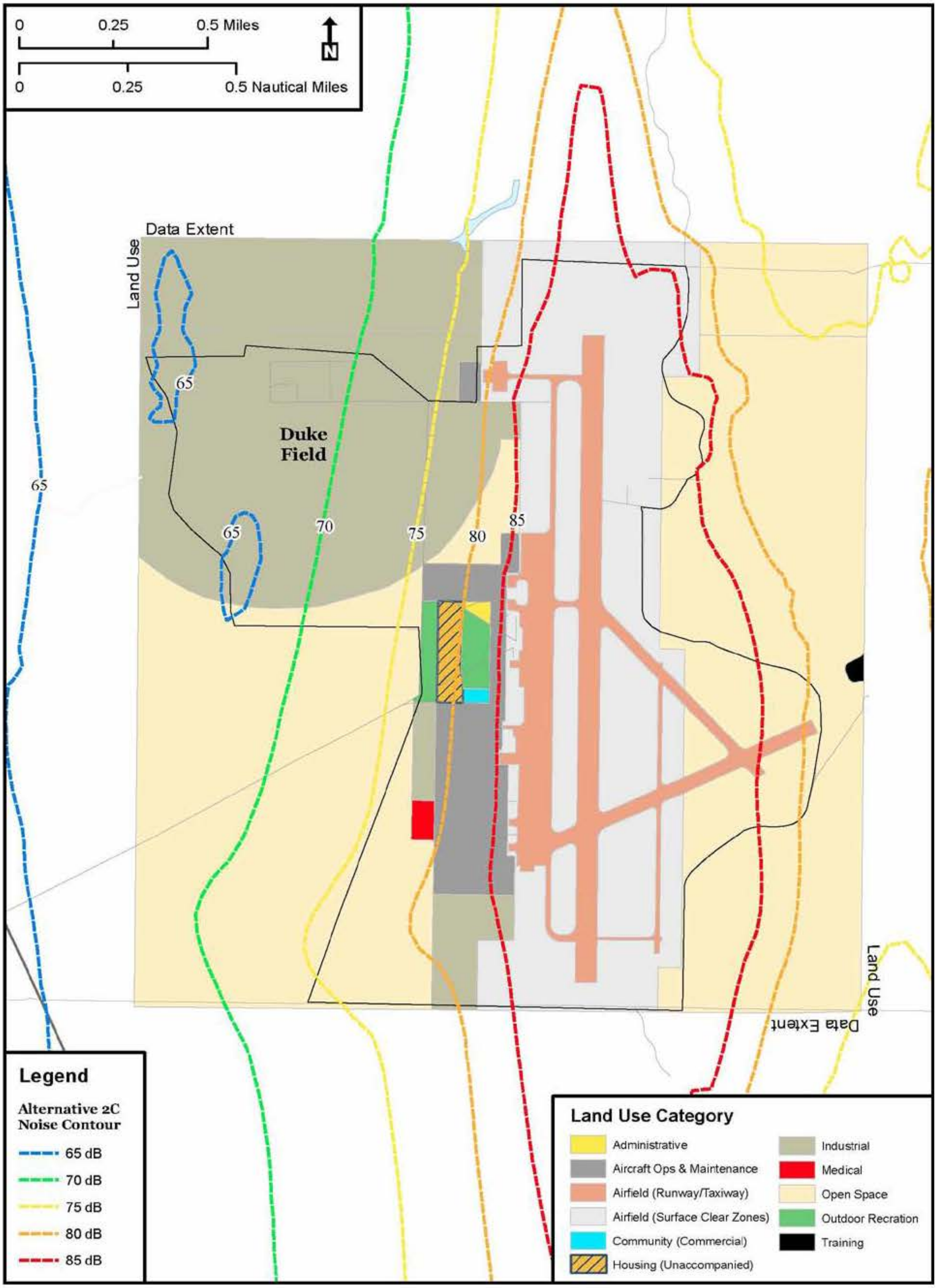


Figure 4-43. On-base Land Use – Alternative 2C (Duke Field)

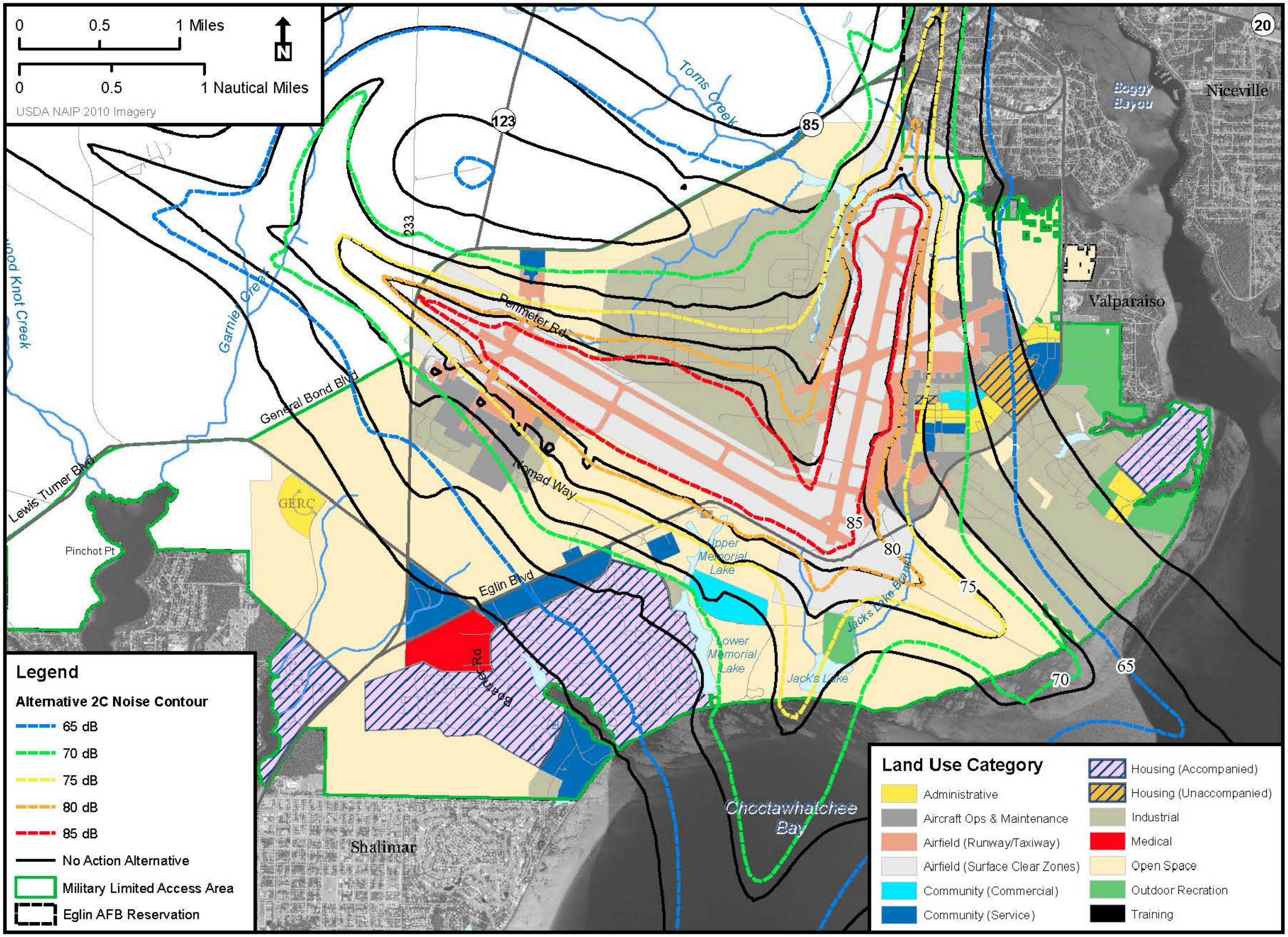


Figure 4-44. On-base Land Use – Alternative 2C (Eglin)

Noise exposures at Choctaw Field would be similar to those described for the No Action Alternative and would not adversely impact existing on-base land use compatibility.

The impacted on-base area surrounding Duke Field, Eglin Main Base, and Choctaw Field is part of the interstitial area of Eglin Range used for military training and is open to the public for recreational activities. The increase in noise exposure above 65 dB DNL would not adversely impact land use or compatibility issues.

Community Land Use

Implementing Alternative 2C would also impact land use compatibility in affected areas off Eglin AFB, north of Duke Field, and adjacent to Choctaw Field, resulting from the increased noise from JSF air operations. The affected areas and the noise contours are shown in Figure 4-45.

Similar to Alternative 2B, JSF air operations at Eglin Main Base would primarily affect off-base areas in Valparaiso and Niceville. The affected areas and the noise contours are shown in Figure 4-46.

The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 719, 827, and 2,233 acres, respectively (Table 4-46).

Table 4-46. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2C

	Number of Acres Impacted											
LAND USE CATEGORY	EGLIN MAIN				DUKE FIELD				CHOCTAW FIELD			
	65–74 dBA		75+ dBA		65–74 dBA		75+ dBA		65–74 dBA		75+ dBA	
Residential	247.7	↑ 12.2	20.8	↑ 7.9	3.7	↑ 3.69	0	0	-	-	-	-
Commercial	63.9	↑ 5.7	27.5	↑ 1.2	0	0	0	0	-	-	-	-
Industrial	9.79	↓ 0.21	2	↑ 0.2	118.8	↑ 118.8	0	0	-	-	-	-
Open/Agricultural/ Low-Density	281	↓ 9.6	45.7	↑ 13	613.2	↑ 613.13	0	0	2,177	↑ 100.4	56	↓ 1.4
Public/Quasi-Public	19	↑ 3.3	0	0	91.3	↑ 91.3	0	0	-	-	-	-
Recreational	1.5	↑ 0.2	0	0	0	0	0	0	-	-	-	-
TOTAL Land Area	**622.89**	**↑ 11.59**	**96**	**↑ 22.3**	**827**	**↑ 826.92**	**0**	**0**	**2,177**	**↑ 100.4**	**56**	**↓ 1.4**

Amount of increase/decrease/no change from No Action Alternative

Note: Land use estimates were made based on 2010 Northwest Florida Water Management District land use data (Florida Department of Environmental Protection [FDEP], 2010) and do not include water areas.

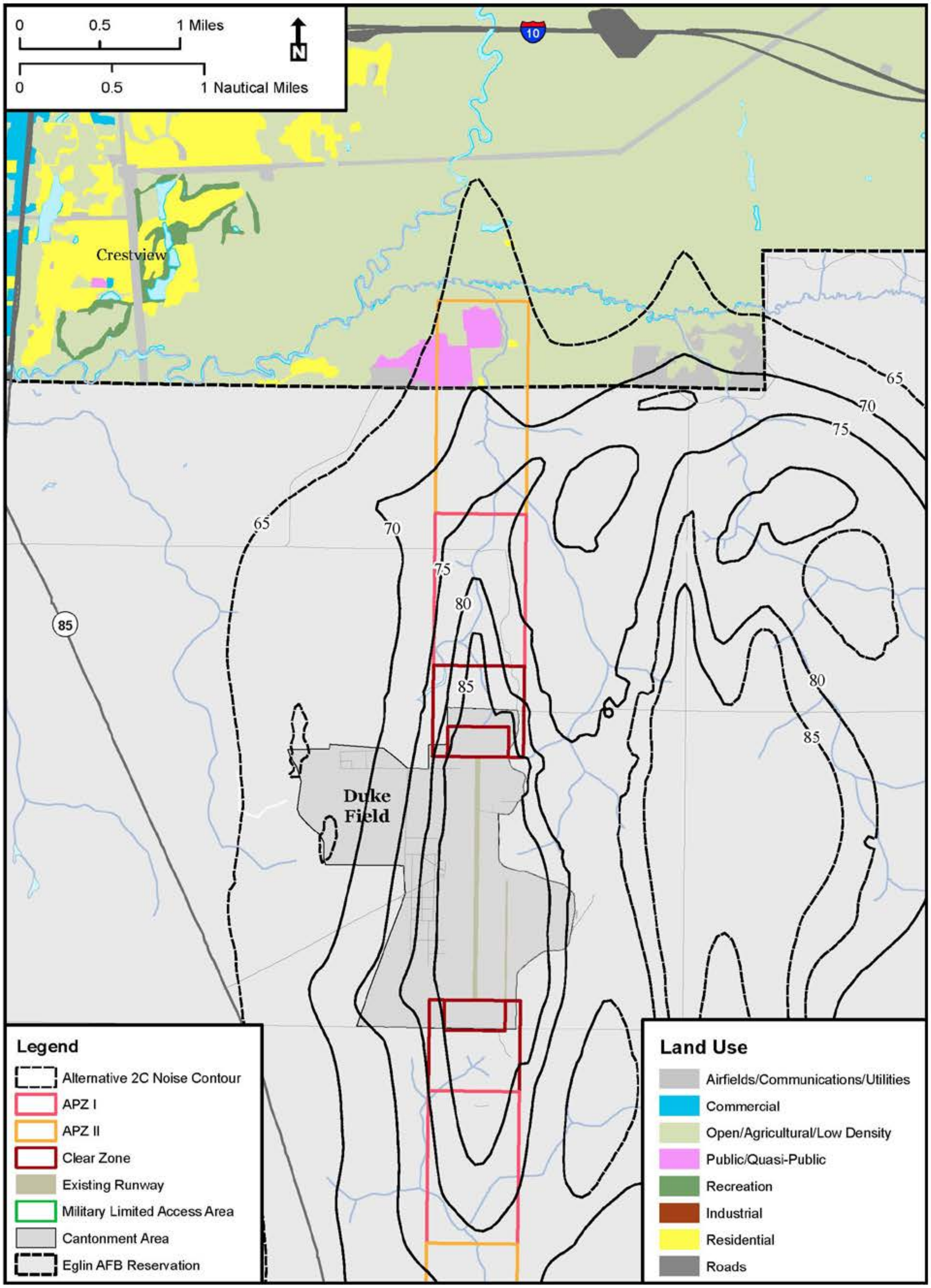


Figure 4-45. Land Use Off-base (Duke Field) – Alternative 2C

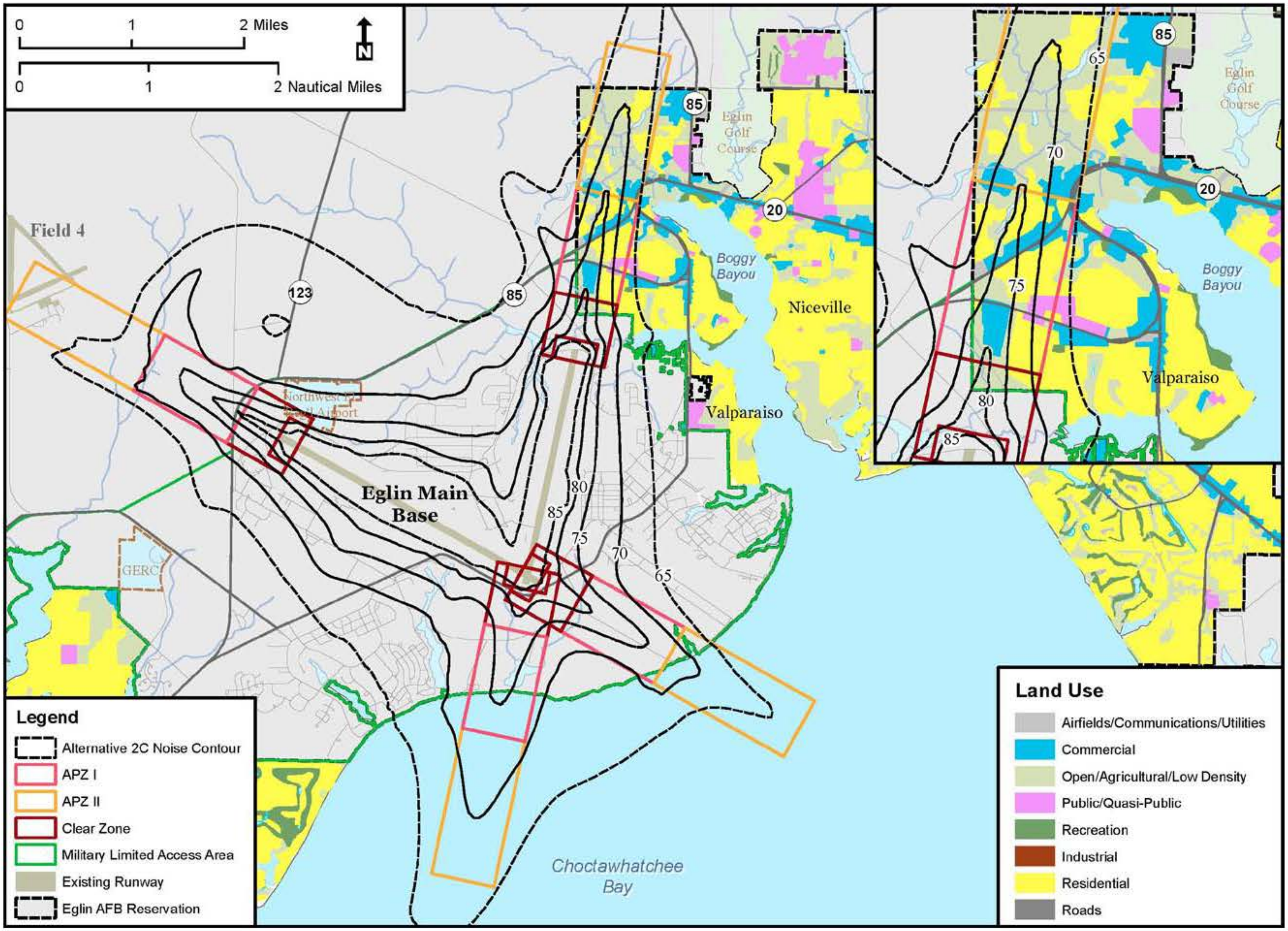


Figure 4-46. Land Use Off-base (Eglin) – Alternative 2C

4.4.2.4 *Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field*

Construction

Construction of additional facilities to support the JSF beddown at Duke Field would be within a 672-acre area directly adjacent to the west side of the Duke Field cantonment. Construction-related impacts in this area would be identical to those described for Alternative 2A. Existing land use at Eglin Main RW 12 and Choctaw Field would not change under this Alternative.

Construction-related impacts on land use for the other IJTS support facilities that would be located at Eglin Main Base were previously analyzed in the FEIS, and all construction was authorized by the February 2009 ROD.

Flight Operations

Military Land Use

Figure 4-47 shows the affected public access areas on Duke Field, and Figure 4-48 shows the existing land use for Duke Field and the JSF noise contours for Alternative 2D. On-base impacts from JSF air operations at Duke Field would be almost identical to those under Alternative 2A.

Figure 4-49 shows the existing land use for Eglin Main Base and the JSF noise contours for Alternative 2D. Approximately 6,917 acres of Eglin Main Base property could be exposed to noise levels greater than 65 dB DNL.

Noise exposures at Choctaw Field would be similar to those described for the No Action Alternative and would not adversely impact existing on-base land use compatibility.

The impacted on-base area surrounding Duke Field, Eglin Main Base, and Choctaw Field is part of the interstitial area of Eglin Range used for military training and is open to the public for recreational activities (Figure 4-47). The increase in noise exposure above 65 dB DNL would not adversely impact land use or compatibility issues.

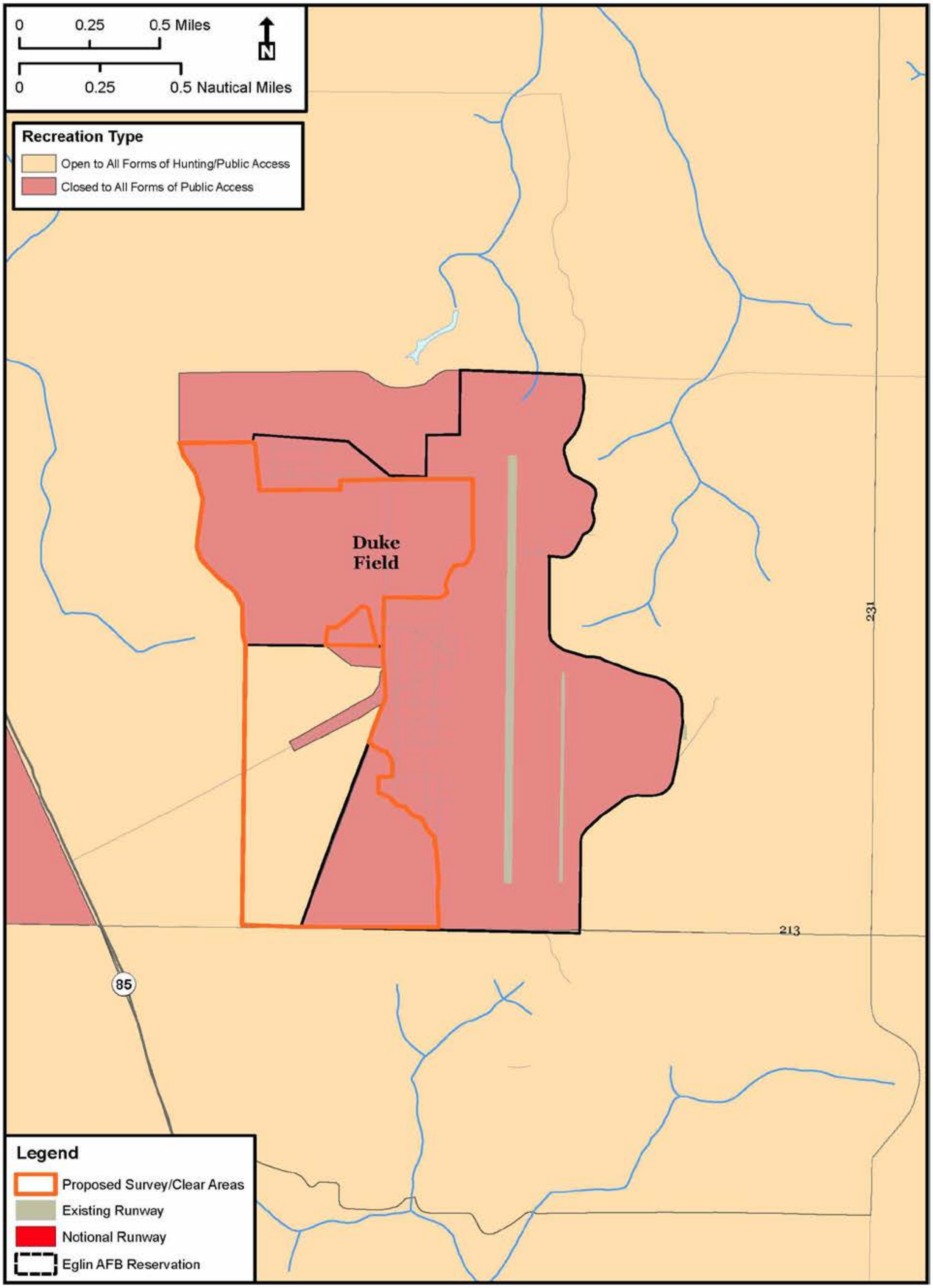


Figure 4-47. Recreation Units On-base (Duke Field) – Alternatives 2D and 2E

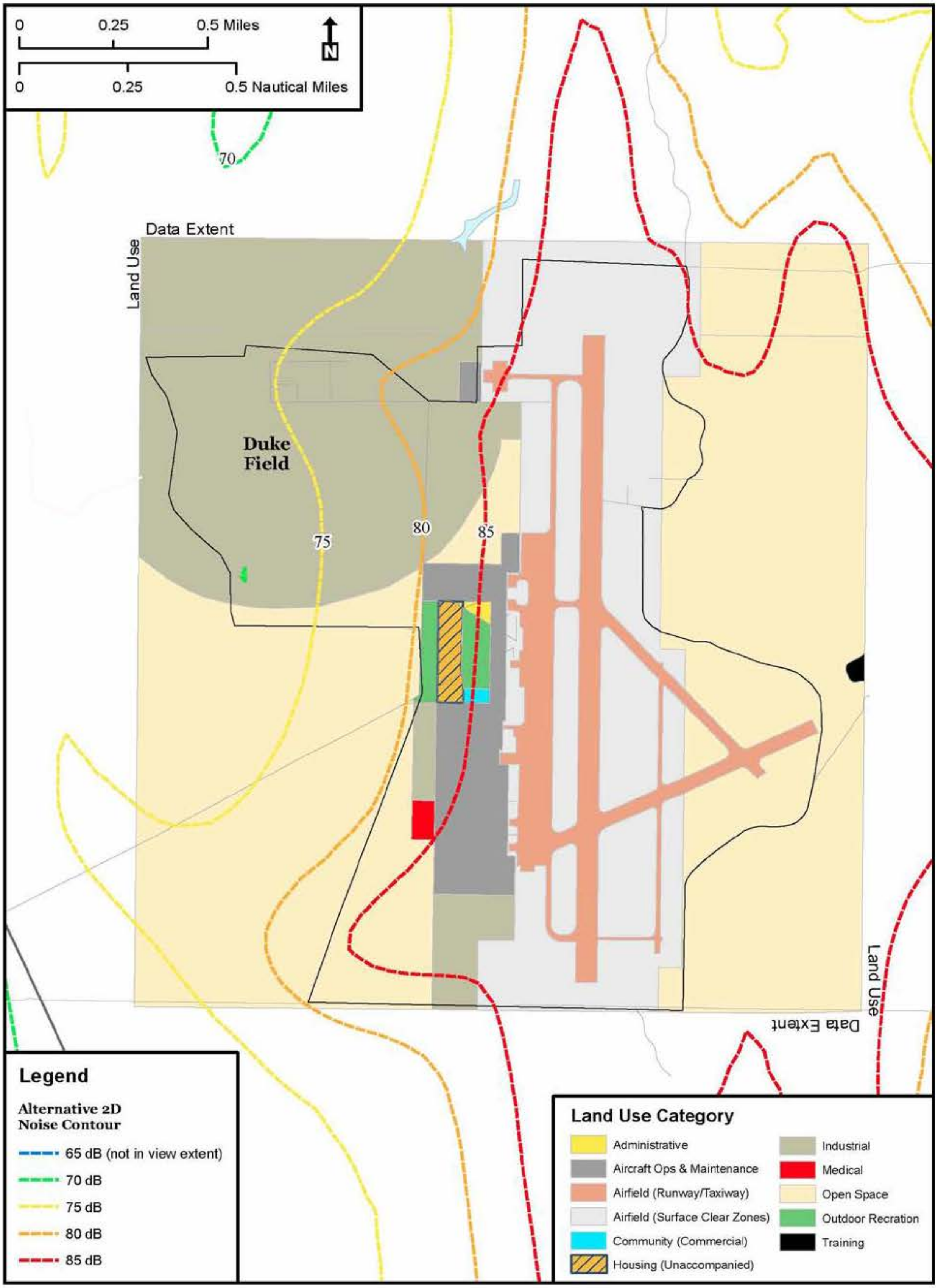


Figure 4-48. On-base Land Use – Alternative 2D (Duke Field)

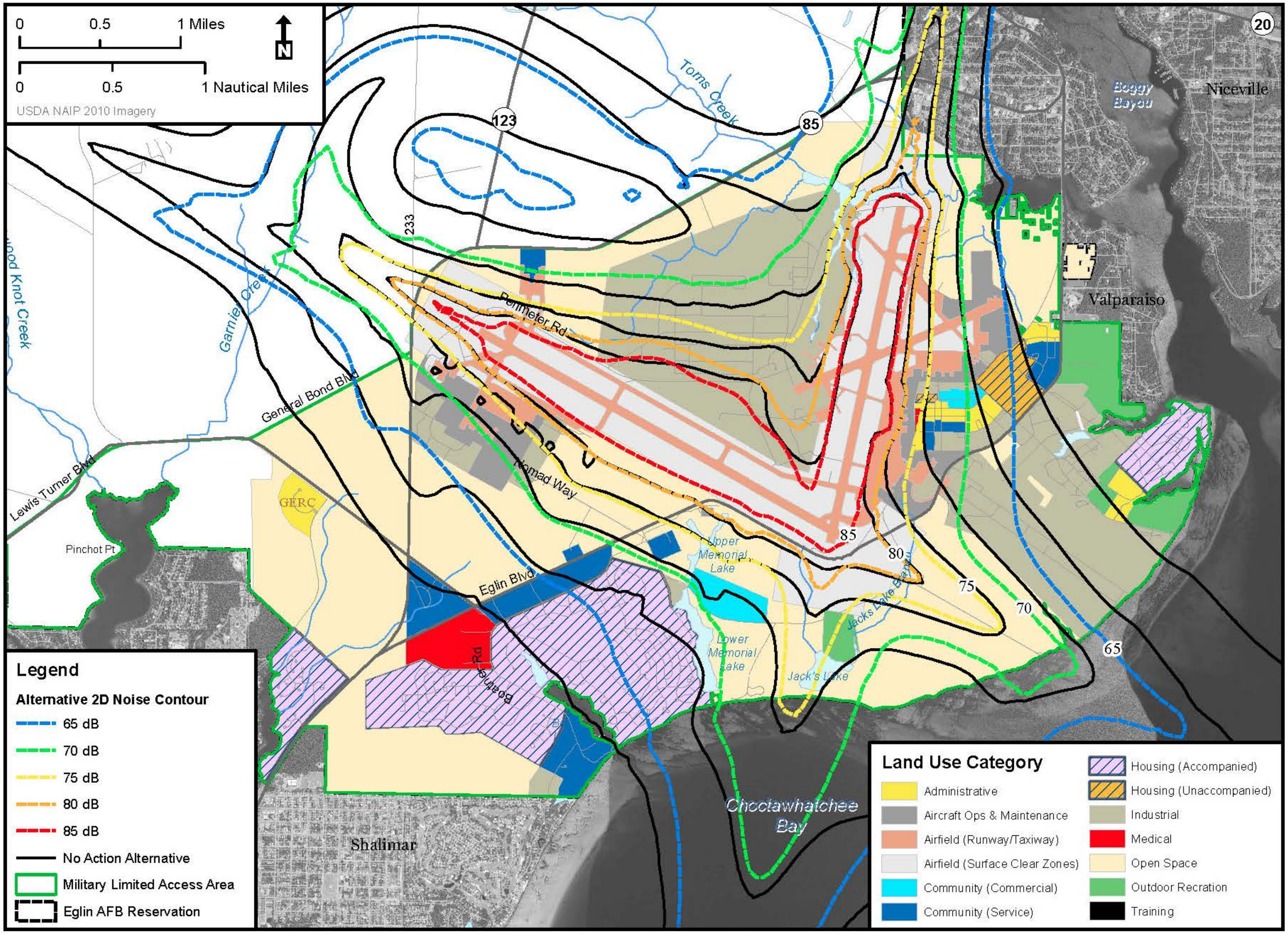


Figure 4-49. On-base Land Use – Alternative 2D (Eglin)

Community Land Use

Implementing Alternative 2D would also impact land use compatibility in affected areas off Eglin AFB, north of Duke Field, and adjacent to Choctaw Field, resulting from the increased noise from JSF air operations. The affected areas and the noise contours are shown in Figure 4-50.

Similar to Alternatives 2B, and 2C, JSF air operations at Eglin Main Base would primarily affect off-base areas in Valparaiso and Niceville. The affected areas and the noise contours are shown in Figure 4-51.

The total off-base area in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 723, 708, and 2,107 acres, respectively (Table 4-47).

Table 4-47. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2D

	Number of Acres Impacted											
LAND USE CATEGORY	EGLIN MAIN				DUKE FIELD				CHOCTAW FIELD			
	65–74 dBA		75+ dBA		65–74 dBA		75+ dBA		65–74 dBA		75+ dBA	
Residential	246.1	↑ 10.6	22.8	↑ 9.9	4	↑ 3.99	0	0	-	-	-	-
Commercial	63.9	↑ 5.7	27.7	↑ 1.4	0	0	0	0	-	-	-	-
Industrial	9.8	↓ 0.2	2.4	↑ 0.6	28.6	↑ 28.6	0	0	-	-	-	-
Open/Agricultural/ Low-Density	283.7	↓ 6.9	45.9	↑ 13.2	569.6	↑ 569.53	0	0	2,082.6	↑ 6	24.75	↓ 32.65
Public/Quasi-Public	18.8	↑ 3.1	0	0	105.6	↑ 105.6	0	0	-	-	-	-
Recreational	1.57	↑ 0.27	0	0	0	0	0	0	-	-	-	-
TOTAL Land Area	**623.87**	**↑ 12.57**	**98.8**	**↑ 25.1**	**707.8**	**↑ 707.72**	**0**	**0**	**2,082.6**	**↑ 6**	**24.75**	**↓ 32.65**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Note: Land use estimates were made based on 2010 Northwest Florida Water Management District land use data (Florida Department of Environmental Protection [FDEP], 2010) and do not include water areas.

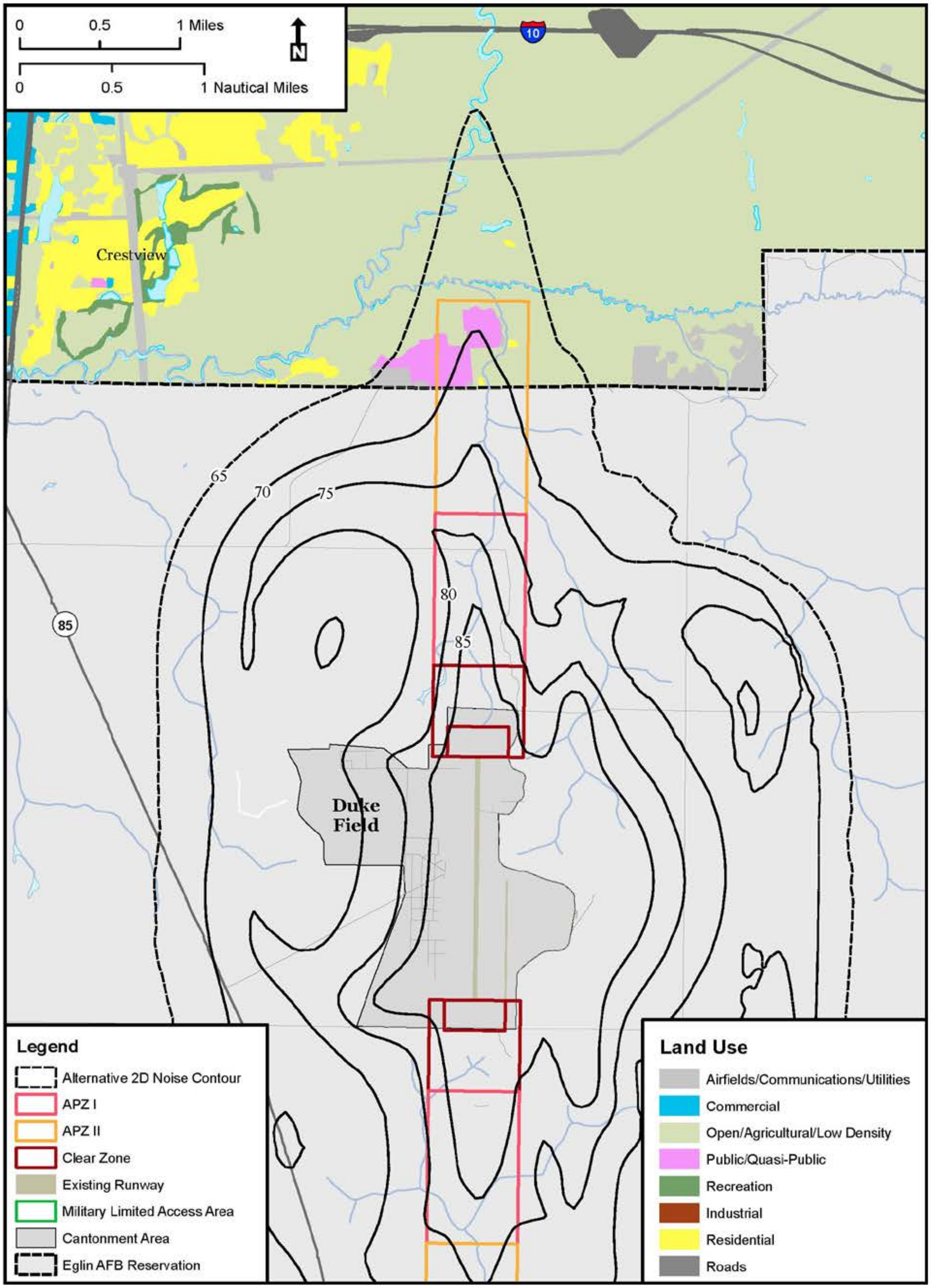


Figure 4-50. Land Use Off-base (Duke Field) – Alternative 2D

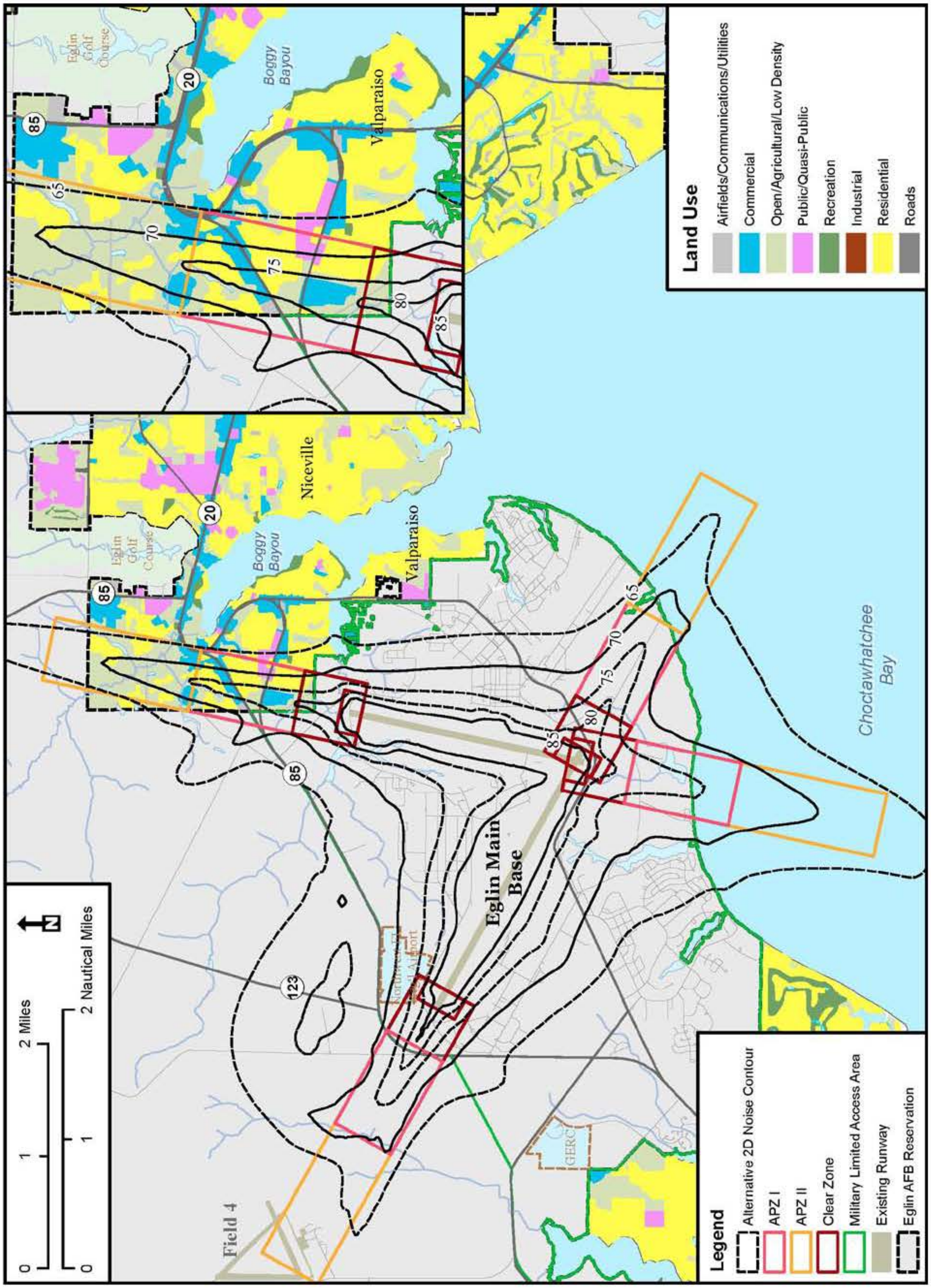


Figure 4-51. Land Use Off-base (Eglin) – Alternative 2D

4.4.2.5 *Alternative 2E – Duke Field Single Runway Plus Choctaw Field*

Construction

Construction-related impacts on land use would be identical to those described for Alternative 2D. Existing land use at Choctaw Field would not change.

Flight Operations

Military Land Use

Figure 4-52 shows the existing land use for Duke Field and the JSF noise contours for Alternative 2E. On-base impacts from JSF air operations at Duke Field would be almost identical to those under Alternative 2A.

Noise exposures at Choctaw Field would have a slightly larger footprint than those described for the No Action Alternative and would not adversely impact existing on-base land use compatibility.

The impacted on-base area surrounding Duke Field and Choctaw Field is part of the interstitial area of Eglin Range used for military training and is open to the public for recreational activities. The increase in noise exposure above 65 dB DNL would not adversely impact land use or compatibility issues.

Community Land Use

Implementing Alternative 2E would also impact land use compatibility in affected areas north of Duke Field and adjacent to Choctaw Field, resulting from the increased noise from JSF air operations. The affected areas and the noise contours are shown in Figure 4-53.

The total off-base area in the vicinity of Duke Field and Choctaw Field that would be exposed to aircraft noise greater than 65 dB DNL is approximately 787 and 2,432 acres, respectively (Table 4-48). No JSF operations would occur at Eglin Main Base under Alternative 2E; however, acreages impacted by non-JSF operations are included in Table 4-48 as a reference.

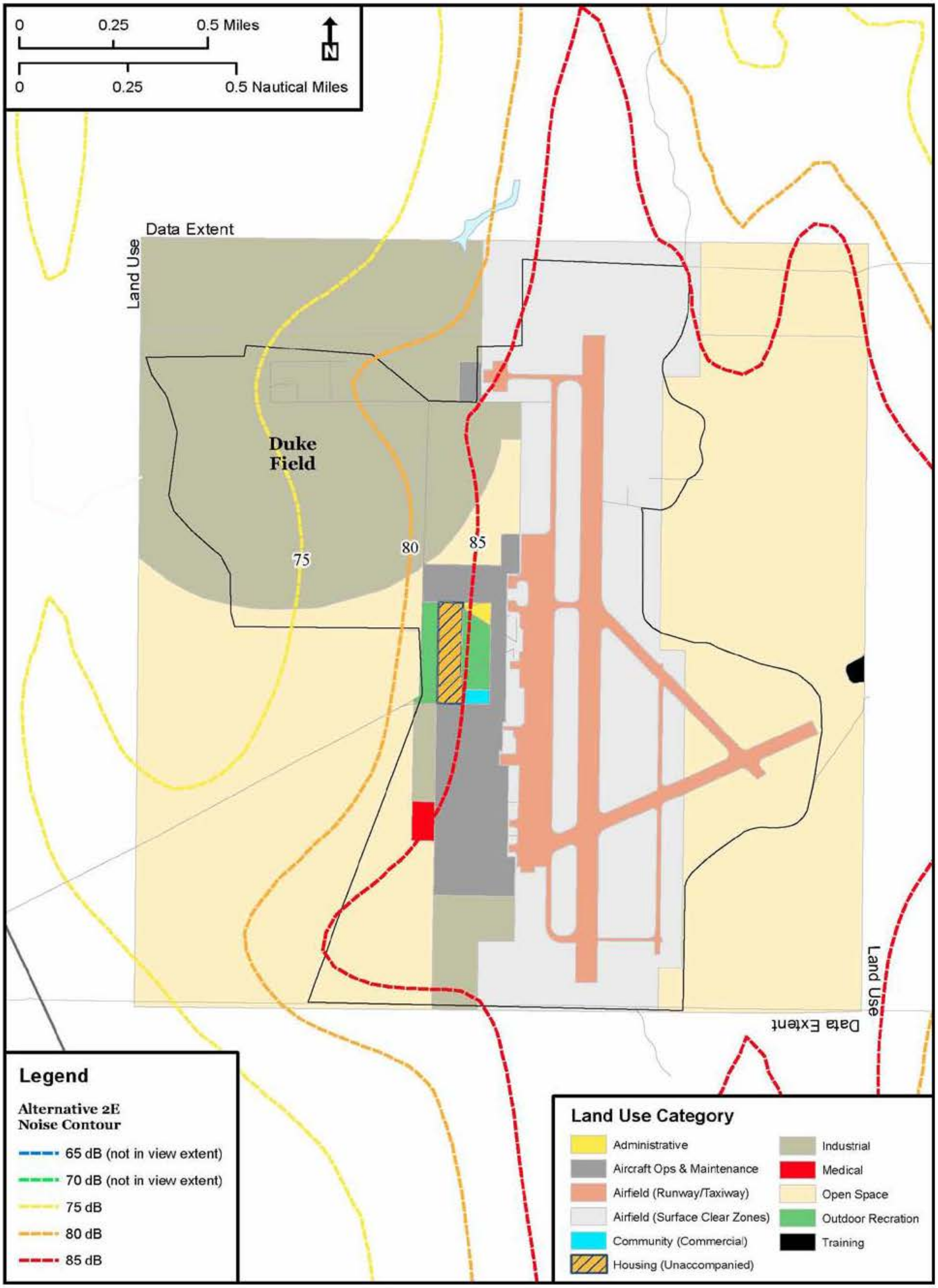


Figure 4-52. On-base Land Use – Alternative 2E (Duke Field)

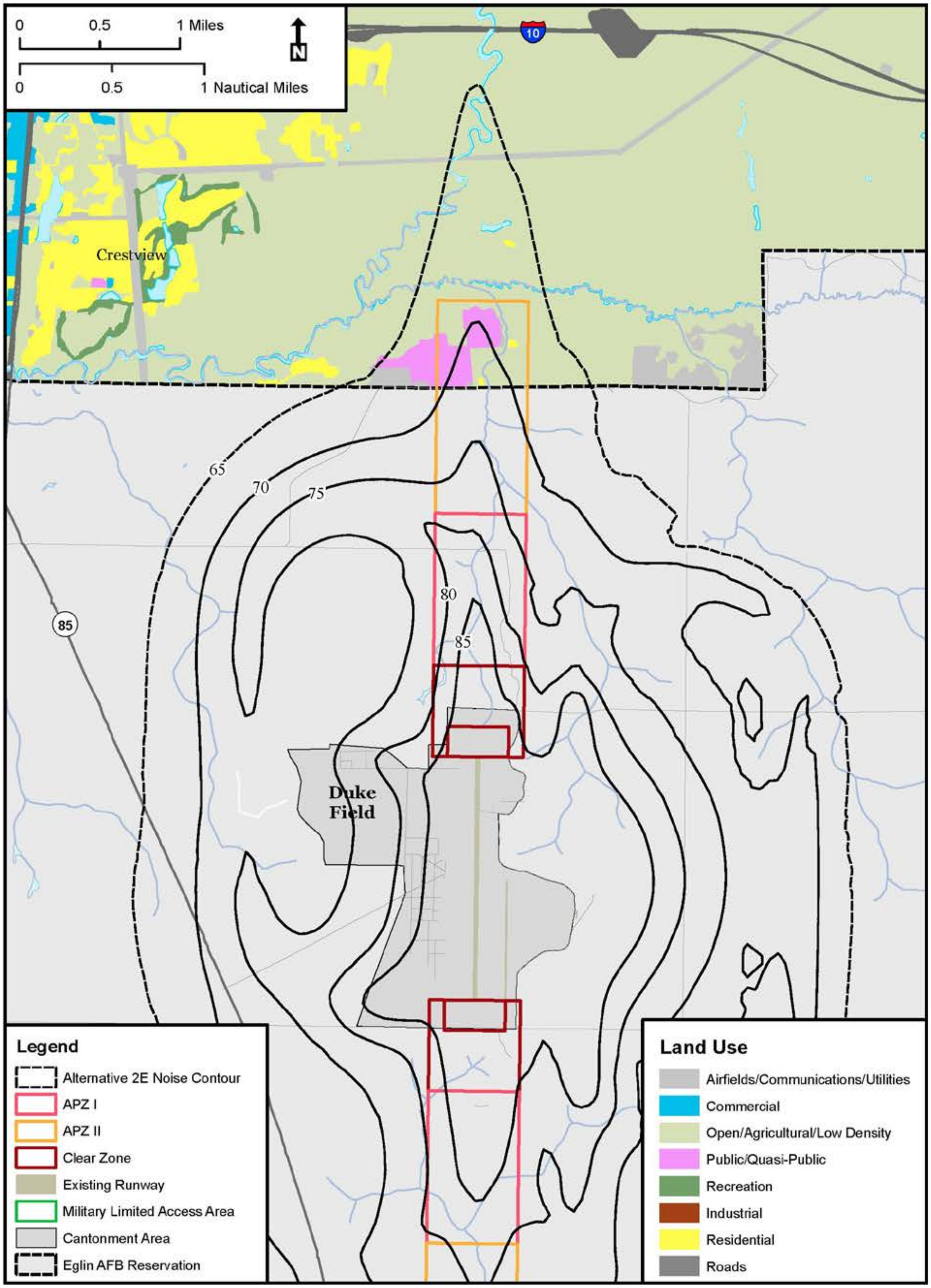


Figure 4-53. Land Use Off-base (Duke Field) – Alternative 2E

Table 4-48. Number of Acres Impacted off Eglin Main, Duke Field, and Choctaw Field by Land Use Category – Alternative 2E

LAND USE CATEGORY	Number of Acres Impacted											
	EGLIN MAIN				DUKE FIELD				CHOCTAW FIELD			
	65–74 dBA		75+ dBA		65–74 dBA		75+ dBA		65–74 dBA		75+ dBA	
Residential	168.0	↓ 67.5	17.8	↑ 4.9	4	↑ 3.99	0	0	-	-	-	-
Commercial	45.5	↓ 12.7	9.2	↓ 17.1	0	0	0	0	-	-	-	-
Industrial	9.21	↓ 0.79	19	↑ 17.2	31.6	↑ 31.6	0	0	-	-	-	-
Open/Agricultural/ Low-Density	285.7	↓ 4.9	34.2	↑ 1.5	644.6	↑ 644.53	0	0	2,243.2	↑ 166.6	188.4	↑ 131
Public/Quasi-Public	4.4	↓ 11.3	0	0	107.2	↑ 107.2	0	0	-	-	-	-
Recreational	0.62	↓ 0.68	0	0	0	0	0	0	-	-	-	-
TOTAL Land Area	**513.42**	**↓ 97.88**	**80.2**	**↑ 6.5**	**787.4**	**↑ 787.32**	**0**	**0**	**2,243.2**	**↑ 166.6**	**188.4**	**↑ 131**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Notes:
Land use estimates were made based on 2010 Northwest Florida Water Management District land use data (Florida Department of Environmental Protection [FDEP], 2010) and do not include water areas.
No JSF operations would occur at Eglin Main Base under Alternative 2E; however, acreages impacted by non-JSF operations are included in the table above as a reference.

4.4.3 Mitigations

Because most of the potential impacts to land use are directly related to noise from the F-35 flight operations, see Section 4.3.4 for mitigations related to noise. These mitigations may help ensure that incompatible land use impacts are mitigated as well. No specific land use mitigations have been identified at this time. However, should appropriate mitigations be identified through the adaptive management process, the Air Force may choose to implement them at that time.

4.5 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The socioeconomic analysis focuses on the potential impacts from the incoming personnel and flight operations, as well as construction programs, that would support the alternative actions. The incoming personnel and construction activities would bring income, employment, and new demands for products and services into the local economy, which would lead to population growth, new jobs, greater income, and increased requirements for public services. Potential socioeconomic impacts were analyzed by comparing the change in baseline socioeconomic indicators as presented in the No Action Alternative with the action alternatives using the same analysis methodology described in Section 3.5.

Tyndall AFB

As indicated in Section 4.3, DNL noise contours indicate that the addition of the F-35 operations associated with the JSF IJTS are consistent with those operations associated with the *F-22 EA* and would be less than 1 dB difference. Therefore, the impacts would be the same as those stated in the *F-22 EA*. A summary of those impacts indicated flight operations from the F-22 and T-38A training missions would not present a disproportionately high and adverse environmental effect to minority or low-income populations since the share of affected populations of concern is comparable to the populations of concern in Bay County. Noise levels at Tyndall Elementary would remain the same relative to baseline conditions. Noise levels at Parker Elementary would remain below 65 dB DNL. In addition, noise levels in the training airspace would not generate disproportionately high and adverse human health or environmental effects on minority populations, low-income populations, or children living under the airspace since the noise levels generated in these airspace units would remain the same as noise levels under current conditions.

4.5.1 Alternative 1 – Eglin Main Base

For potential socioeconomic impacts, the main drivers for analysis are the changes in personnel and the location of personnel that may affect the distribution of demand for public services and the concentration of socioeconomic impacts. Therefore, the analysis of impacts focuses on the location of the main training base. It is likely that the majority of incoming personnel would choose to relocate to an area with an easy commute to Eglin Main Base within Okaloosa County; therefore, it is presumed that most of the potential socioeconomic impacts would be focused in Okaloosa County. In Chapter 3, Table 3-11 displays the estimated socioeconomic impacts for each socioeconomic indicator resulting from the addition of 59 F-35 aircraft compared with the No Action Alternative, discussed in Section 3.5.5 *(No Action Alternative Consequences)*.

4.5.1.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Personnel and Construction

Personnel impacts would be the same as those discussed in the No Action Alternative, as there would be no additional personnel. The only change between the No Action Alternative and Alternative 1A would be the manner in which flight operations would be conducted.

During scoping, one commenter expressed concern that the new demands on the Eglin Range Complex caused by the incoming F-35 aircraft and other missions would exceed the capacity of the Range Complex's assets, such as ranges and airspace, to support all of the missions. As a result of the perceived limited capacity of the Eglin Range Complex, the commenter expressed concern that the Test Wing would leave Eglin and the local region would lose high paying jobs as a result. Eglin AFB is a part of the Major Range Test Facility Base (MRTFB) system and as such has a very high military value to the DoD. It is a dynamic military installation, and the 96th Test Wing (96 TW) Commander is the Eglin MRTFB Commander. There are over 70 different customers who utilize the Eglin MRTFB on a daily basis. The 96 TW schedules range and airspace assets on a daily basis for all customers based on their requirements. While there is a DoD priority system in place, the 96 TW makes every effort to get all customers what they require. The F-35 program will be a customer of the MRTFB just as AFSOC, the Army 7th Special Forces Group (Airborne) (7SFG(A)), 6th Ranger Training Battalion, Naval School Explosive Ordnance Disposal (EOD), Air Force Research Laboratory, and other test and training customers are currently. The SEIS alternatives have been designed to efficiently integrate their mission and minimize their impact on all MRTFB customers. The SEIS alternatives maximize the use of all airspace available and only use the Eglin land range when mission requirements dictate. The F-35 program will utilize all regional special use airspace to ensure the military value of the Eglin MRTFB is not degraded.

Flight Operations

Under Alternative 1A, the 59 F-35 aircraft would have the full utilization of both runways at Eglin Main Base for the majority of training activities, as well as the use of supporting runways at Duke Field and Choctaw Field. The change in flight operations would have a large effect on the range and distribution of the average noise levels that have the potential to impact off-base residents. Table 4-49 presents the number of residents in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field potentially impacted by noise levels above 65 dB DNL.

There are a number of factors that affect property values that make predicting impacts difficult. Factors directly related to the property, such as size, improvements, and location of the property, as well as current conditions in the real estate market, interest rates, and housing sales in the area, are more likely to have a direct adverse impact on property values. Several studies have been conducted analyzing property values as they relate to military and civilian aircraft noise. One study conducted a regression analysis of property values as they relate to aircraft noise at two military installations (Fidell, et al., 1996). This study found that while aircraft noise at these installations may have had minor impacts on property values, it was difficult to quantify those impacts because other factors, such as the quality of the housing near the installations and the local real estate market, had a larger impact on property values. Therefore, the regression analysis was not able to predict the impact of aircraft noise on the property values of two comparable properties.

Table 4-49. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 1A (Preferred Alternative)

Average Noise Levels (dB)	TOTAL Affected OFF-Base Population	In the vicinity of EGLIN MAIN BASE	In the vicinity of DUKE FIELD	In the vicinity of CHOCTAW FIELD
65–69	1,234	1,231 ↑243	1 0	2 0
70–74	1,033	1,033 ↑398	0 0	0 0
75–79	549	549 ↑375	0 0	0 0
80–84	97	97 ↑97	0 0	0 0
85+	0	0 0	0 0	0 0
TOTAL >65 dB DNL	**2,913**	**2,910 ↑1,113**	**1 0**	**2 0**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Another study analyzed 33 other studies attempting to quantify the impact of noise on property values (Nelson, 2003). The study analyzed the property values of similar properties, using one property located near a source of noise, specifically an airport, and one property not located near a source of noise. The result of the study is that, considering all other factors (e.g., neighborhood characteristics and desirability, local real estate market conditions, school districts) as equal, an adverse impact on property values as a result of aircraft noise is possible and estimates that the value of a specific property could be discounted between 0.5 and 0.6 percent per decibel when compared with a similar property that is not impacted by aircraft noise. However, additional indications are that the discount for property values as a result of noise would be higher for noise levels above 75 dB DNL (Nelson, 2003). Although property values are more likely to be directly affected by other factors, such as property or neighborhood characteristics and the local real estate market, there may be the potential that aircraft noise could have an impact on property values.

Scoping commenters also expressed concern that the noise levels associated with the F-35 could negatively affect tourism and outdoor recreation. It is not anticipated that tourism and outdoor recreation industries would be adversely impacted by noise levels associated with the F-35. Tourism in general is more sensitive to the condition of local, regional, and national economies rather than individual factors. The current tourism industry has been particularly hard hit by the national recession. Noise levels generated by 59 F-35 aircraft with unconstrained flight operations would not directly impact areas where high concentrations of tourism is expected, specifically on the beaches and coastline properties. Individuals involved in outdoor recreation could be annoyed by noise generated from overflights; however, it is not expected that these noise levels would discourage tourism as a whole in the ROI. The increase in population, as well as the additional activity at Eglin AFB, could benefit the ROI's tourism industry. Personnel and their families would likely take advantage of the recreational opportunities in the area. Also, the beddown of the F-35 would encourage additional overnight visitors, as contractors or other military personnel would travel to the area to conduct business.

Another scoping commenter expressed concern that the F-35 training operations sharing both runways with the Northwest Florida Regional Airport would affect the airport's operations. Commercial flights at the Northwest Florida Regional Airport are scheduled occurrences that can be coordinated with F-35 flight training operations. It is anticipated that the coordination would be similar to what was required while the F-15s were active. However, with the increase in operations tempo under the F-35 compared with the F-15, it is possible that general aviation would require additional coordination and may experience ground holds or other delays associated with the F-35. There are two other airports specializing in general aviation: Bob Sikes Airport in Crestview and the Destin Airport located in Destin. During F-35 flight training, these airports may be more accessible with fewer delays for general aviation. However, with additional scheduling and coordination between the Air Force and the Northwest Florida Regional Airport, no adverse impacts on airport operations are anticipated.

In summary, the beddown of 59 F-35 aircraft without constraints on flight operations could have an adverse impact on the socioeconomic conditions in the ROI, specifically on property values. Significant adverse socioeconomic impacts on tourism, airport operations, and other economic concerns are not anticipated. Construction activities would generate temporary economic benefits.

Environmental Justice

No adverse impacts are expected to disproportionately affect minority or low-income populations. The environmental justice analysis was conducted in the same manner for Alternative 1A as described under the No Action Alternative. The communities of comparison are comprised of Okaloosa County and Santa Rosa County.

The share of minority and low-income populations expected to be affected by noise levels above 65 dB DNL in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field are shown in Figure 4-54 and Table 4-50. Approximately 20.45 percent (595 residents) of the total affected off-base population would be minority and 8.11 percent (236 residents) would be low income. The minority population in Okaloosa County comprises 22.9 percent of the total population and the population below the poverty level comprises 10.6 percent. Since the affected minority and low-income populations are below the total percentage of minority and low-income populations in the community of comparison, there is no disproportionate impact to minority and low-income populations.

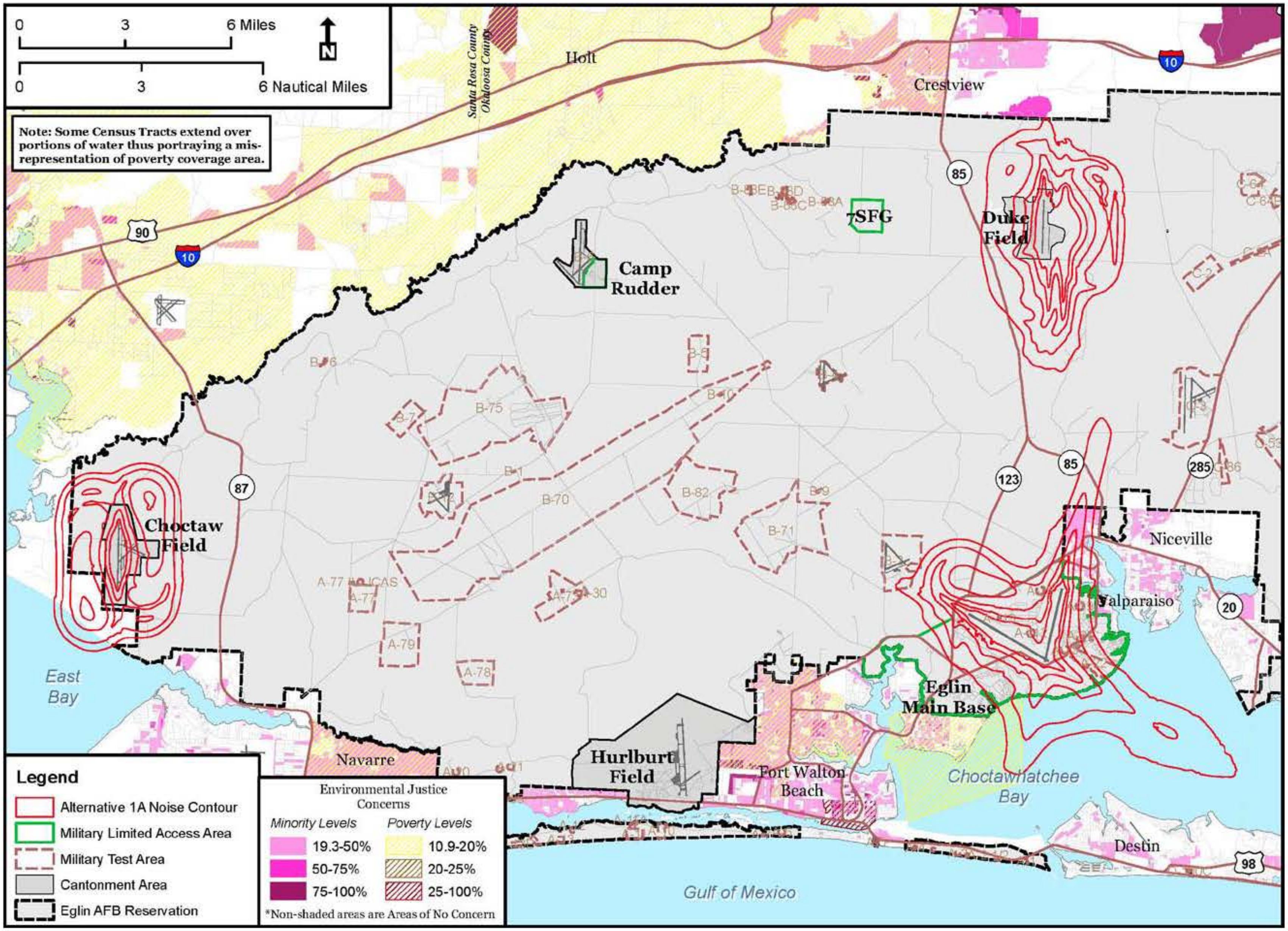


Figure 4-54. Minority and Low-Income Populations, Alternative 1A (Preferred Alternative)

Table 4-50. Affected Populations of Concern, Alternative 1A (Preferred Alternative)

dB Level	*Minority*		*Low-Income*		*Children*	
	Percent	Number	Percent	Number	Percent	Number
Total ≥65 dB DNL	**20.45%**	**595**	**8.90%**	**259**	**25.9%**	**754**
65–69 dB DNL	19.50%	240	9.02%	111	26.2%	322
70–74 dB DNL	23.23%	240	8.81%	91	28.9%	298
75–79 dB DNL	17.85%	98	8.74%	48	21.7%	119
80–84 dB DNL	17.53%	17	9.28%	9	14.9%	14
85+ dB DNL	0.00%	0	0.00%	0	0.0%	0

≥ = greater than or equal to; dB = decibels; DNL = day-night average sound level

Adverse noise impacts could have potentially significant consequences to children, particularly children attending schools and daycares exposed to high noise levels. The share of children affected by noise levels greater than 65 dB DNL is comparable (at 25.9 percent of the total affected population) to the share of children in Okaloosa County, which is the community of comparison. A total of three schools would be exposed to average noise levels 65 dB DNL and above (Figure 4-55). Eglin Elementary, First Assembly of God private school, and the Okaloosa Science, Technology, Engineering, Mathematics, and Medical (STEMM) Center would be exposed to noise level between 70 and 75 dB DNL (Figure 4-55). The Childcare Network daycare could be exposed to noise levels between 75 and 80 dB DNL while the Angels Are Us Learning Center and the Gailey Family Daycare Home could be exposed to noise levels between 65 and 70 dB DNL.

As discussed under the No Action Alternative, schools and daycares are considered compatible with noise levels up to 75 dB DNL with additional noise attenuation. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation. Additionally, these noise levels are not compatible with outdoor use and could contribute to hearing loss in children regularly exposed to aircraft noise. Therefore, the noise levels generated by 59 F-35 aircraft without flight limitations and the potentially adverse impacts on children may be considered significant. Additional detail concerning noise and the potential for interference with learning in terms of ANSI's *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools* is provided in Section 4.3, *Noise*.

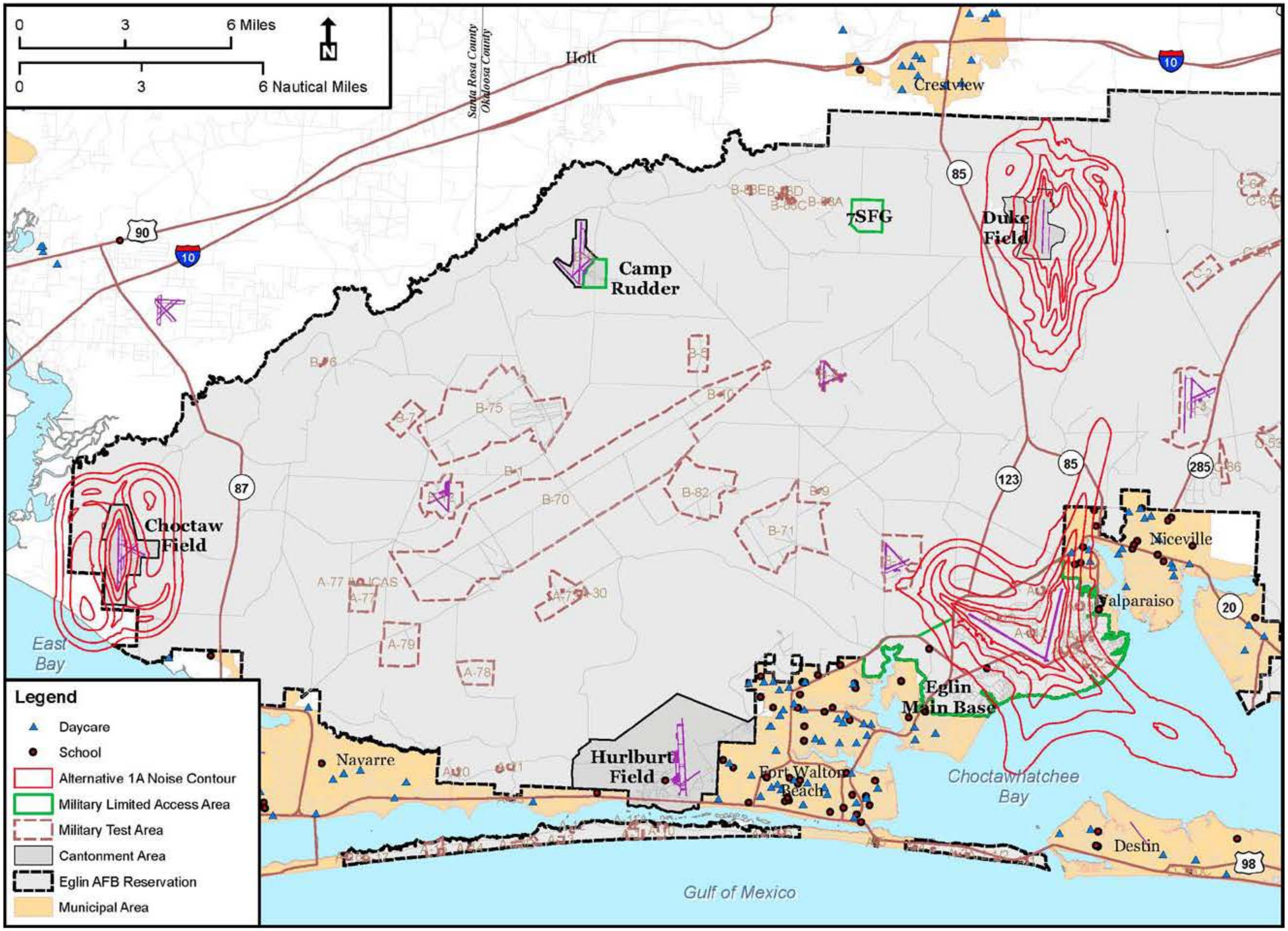


Figure 4-55. Schools and Daycares, Alternative 1A (Preferred Alternative)

4.5.1.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Personnel and Construction

Personnel changes and resulting changes in employment, housing demand, schools, and public services would be the same as those discussed in the No Action Alternative. These potential impacts are presented in Chapter 3, Table 3-11.

Construction expenditures and construction impacts are anticipated to be more extensive than the construction expenditures under the No Action Alternative. Runway construction would require extensive labor and expenditures. These expenditures would generate additional construction employment; however, the employment and resulting beneficial impacts would be temporary. The beneficial impacts from the construction would dissipate once the construction is complete.

Flight Operations

Under Alternative 1I, the 59 F-35 aircraft would primarily utilize the new runway proposed for construction east of Eglin Main Base and existing RW 12/30 for the majority of training activities. Duke Field would be utilized as an auxiliary field. Table 4-51 presents the number of residents in the vicinity of Eglin Main Base, Duke Field, and Choctaw Field potentially impacted by noise levels above 65 dB DNL.

Table 4-51. Number of Residents Potentially Affected by Aircraft Noise Under Alternative 1I

Average Noise Levels (dB)	TOTAL Affected OFF-Base Population	In the vicinity of EGLIN MAIN BASE	In the vicinity of DUKE FIELD	In the vicinity of CHOCTAW FIELD
65–69	968	965 ↓23	1 ■0	2 ■0
70–74	668	668 ↑33	0 ■0	0 ■0
75–79	226	226 ↑52	0 ■0	0 ■0
80–84	0	0 ■0	0 ■0	0 ■0
85+	0	0 ■0	0 ■0	0 ■0
TOTAL >65 dB DNL	**1,862**	**1,859 ↑62**	**1 ■0**	**2 ■0**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

As discussed in Alternative 1A, aircraft noise does have the potential to impact property values; however, other factors, such as property improvements, neighborhood quality, and the conditions of the local real estate market, are more influential on property values than aircraft noise. With high noise levels, property values have the potential to be discounted approximately 0.5 to 0.6 percent for every decibel compared with a similar property that is not exposed to aircraft noise when all other factors, such as neighborhood characteristics and desirability, local real estate conditions, and quality of schools, are held constant (Nelson, 2003). Given the extent of the change in noise levels, there could be the potential that aircraft noise under Alternative 1I may have an impact on property values.

Noise levels generated under Alternative 1I would not directly impact high tourist areas such as area beaches or coastlines; however, outdoor recreation could be disrupted by F-35 overflights and could be considered annoying to individuals engaged in outdoor recreation. Noise levels are not expected to discourage tourism. As described in Alternative 1A, the beddown of the JSF could generate additional tourism as the incoming population participates in the available recreational opportunities.

The F-35 flight operations are not anticipated to adversely affect civilian flight operations. Under Alternative 1I, the proposed runway would lessen potential congestion on the existing Eglin Main Base runways, which currently support Eglin AFB operations as well as the Northwest Florida Regional Airport. Scheduling and coordination of the existing runways between Eglin AFB and the airport would continue as described under Alternative 1A. Potential impacts on general aviation would also be the same as those described under Alternative 1A.

Potential adverse socioeconomic impacts are anticipated in regard to the impacts of high noise levels and property values. Beneficial impacts would result from the increase in employment, revenues, and economic activity, as well as temporary beneficial impacts from construction expenditures. No significant adverse impacts on tourism, airport operations, or other economic concerns are anticipated.

Environmental Justice

No minority or low-income populations in the vicinity of Duke Field or Choctaw Field would be affected by noise levels greater than 65 dB DNL. Of the total affected off-base population in the vicinity of Eglin Main Base (Table 4-52), approximately 21.62 percent (402 residents) would be minority and 8.07 percent (150 residents) would be low income as compared with 22.9 percent minority and 10.6 percent low-income in Okaloosa County (Figure 4-56). Since the affected minority and low-income populations are below the total percentage of minority and low-income populations in the community of comparison, there would be no disproportionate impacts to minority and low-income populations.

Table 4-52. Affected Populations of Concern in the Vicinity of Eglin Air Force Base, Alternative 1I

dB Level	*Minority*		*Low-Income*		*Children*	
	Percent	**Number**	**Percent**	**Number**	**Percent**	**Number**
Total ≥65 dB DNL	**21.62%**	**402**	**8.07%**	**150**	**28.7%**	**533**
65–69 dB DNL	23.52%	227	7.88%	76	31.1%	301
70–74 dB DNL	20.66%	138	8.68%	58	29.6%	198
75–79 dB DNL	16.37%	37	7.08%	16	15.5%	35
80–84 dB DNL	0.00%	0	0.00%	0	0.0%	0
85+ dB DNL	0.00%	0	0.00%	0	0.0%	0

≥ = greater than or equal to; dB = decibels; DNL = day-night average sound level

The share of children of the total population is slightly higher at 28.7 percent than the share of children in the Okaloosa County population. The following three schools could be exposed to noise levels between 65 and 70 dB DNL: First Assembly of God private school, Eglin Elementary School, and the Okaloosa STEMM Center. No schools would be affected by noise levels greater than 70 dB DNL (Figure 4-57).

In addition to the schools, one daycare, the Childcare Network, could be exposed to noise levels between 75 and 80 dB DNL. As discussed under the No Action Alternative and Alternative 1A, schools and daycares are considered compatible with noise levels up to 75 dB DNL with additional noise attenuation. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation. Additionally, these noise levels are not compatible with outdoor use and could contribute to hearing loss in children regularly exposed to the aircraft noise. Therefore, the noise levels generated under Alternative 1I could have adverse impacts on children, which may be considered significant. Additional detail concerning noise and the potential for interference with learning in terms of ANSI's Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools is provided in Section 4.3, *Noise*.

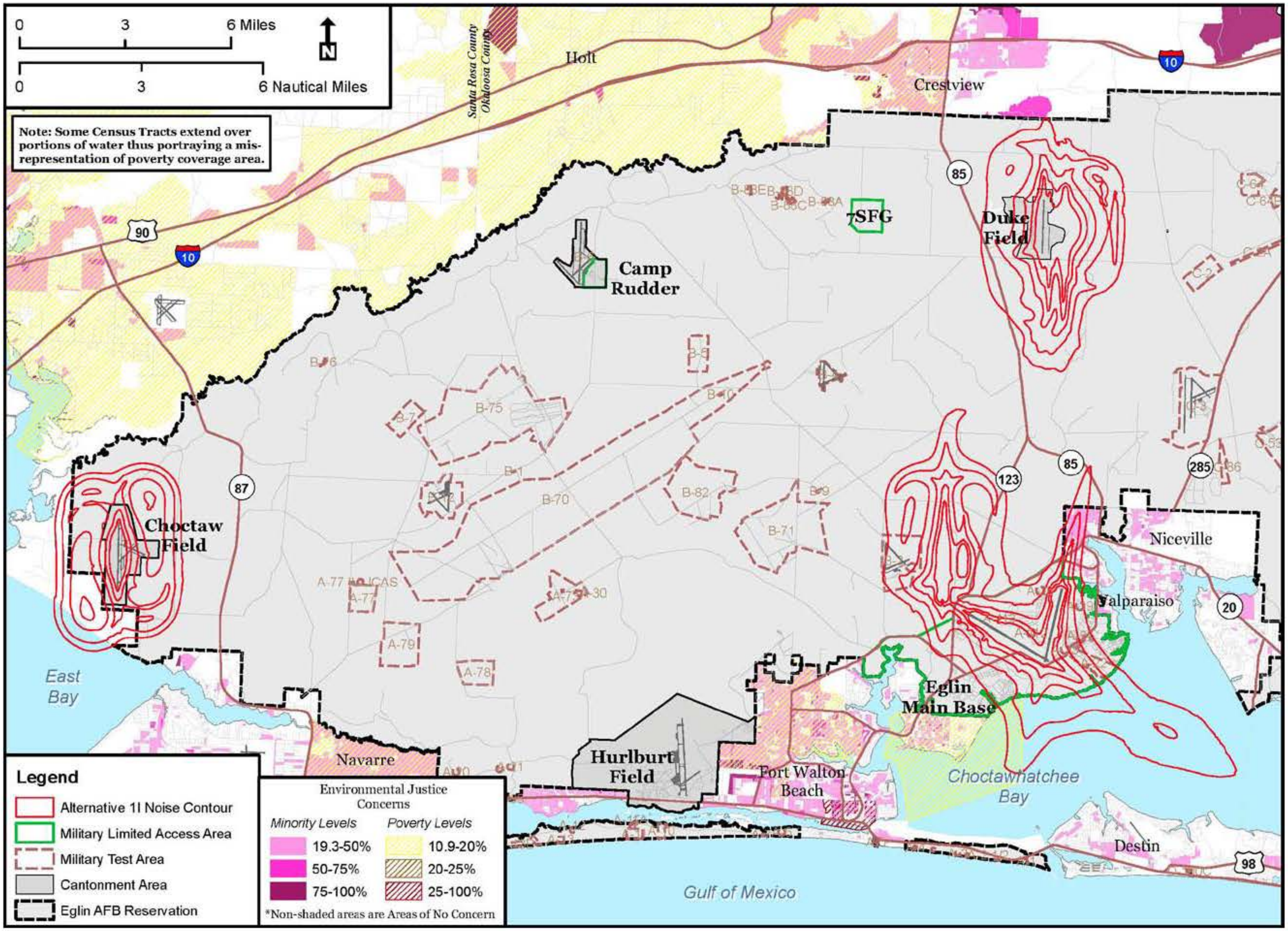
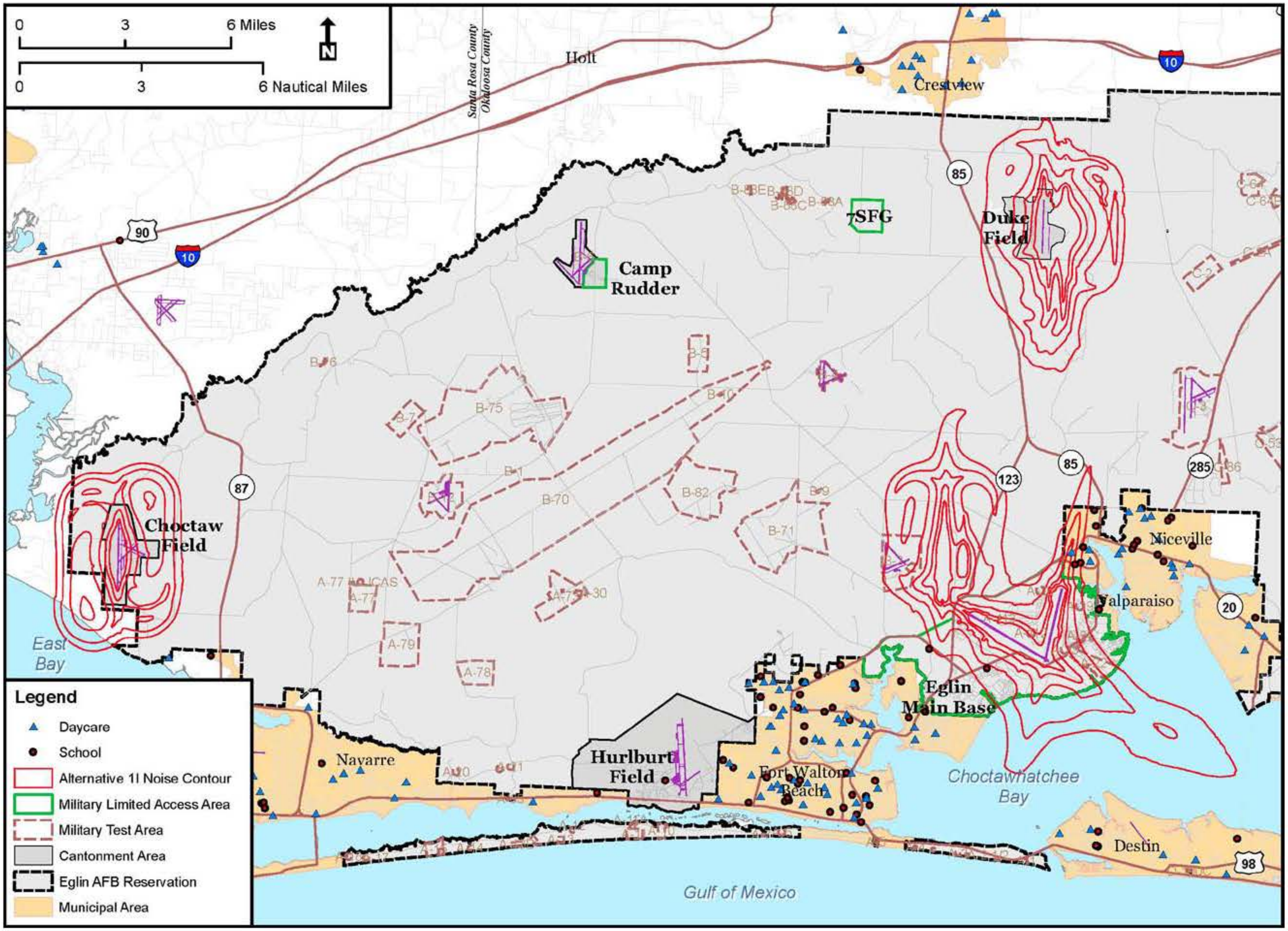


Figure 4-56. Minority and Low-Income Populations, Alternative 1I

Figure 4-57. Schools and Daycares, Alternative 1I



4.5.2 Alternative 2 – Duke Field

Socioeconomic impacts as they relate to personnel changes and construction activities would be the same under all Alternative 2 subalternatives and are therefore discussed below. Impacts related to flight operations would be unique to each alternative and are discussed in following sections.

Personnel and Construction

Personnel changes and resulting changes in employment, housing demand, schools, and public services would be similar to those discussed in the No Action Alternative. These potential impacts are presented in Chapter 3. Table 3-11 *(Potential Socioeconomic Impacts of the No Action Alternative in the ROI)*. Because the Main Operating Base (MOB) for the JSF IJTS would be located at Duke Field, more incoming personnel could choose to live in the northern portions of the counties in the ROI. In particular, personnel may choose to live near the Crestview area in Okaloosa County to reduce commuting time. However, the overall impacts from the personnel in Okaloosa County and the rest of the ROI under any of the Alternative 2 subalternatives would be the same as described under the No Action Alternative and Alternative 1A.

Construction expenditures and construction impacts are anticipated to be more extensive than the construction expenditures under the No Action Alternative or Alternative 1. The construction of an additional runway, as well as the LHA under Alternatives 2A, 2B, and 2C, would require extensive labor and expenditures in addition to the other required facilities and infrastructure listed in Chapter 2 (Section 2.3.5, *Alternative 2: Duke Field Alternative*). These expenditures would generate additional construction employment and income for the duration of the construction; however, the employment and resulting beneficial impacts would be temporary. Under Alternatives 2D and 2E, a new runway would not be constructed at Duke Field; however, impacts would be similar.

4.5.2.1 *Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field*

Flight Operations

Under Alternative 2A, the 59 F-35 aircraft would utilize Duke Field as well as a new runway to be constructed. Choctaw Field would be utilized as an auxiliary field.

Table 4-53 presents the number of residents in the vicinity of Eglin Main Base and Duke Field potentially impacted by noise levels above 65 dB DNL.

As discussed in Section 4.3, *Noise*, under this Alternative, no JSF flight operations would be conducted at Eglin Main Base. However, some flight operations from Duke Field would expose some residents in the vicinity of Eglin Main Base to JSF noise. These residents would be affected by noise levels up to 65 dB DNL. No residents in the vicinity of Eglin Main Base or Duke Field would be impacted by noise levels above 79 dB DNL. Residents in the vicinity of Choctaw Field would not be exposed to noise levels above 75 dB DNL.

Table 4-53. Number of Residents Potentially Affected Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 2A

Average Noise Levels (dB)	TOTAL Affected OFF-Base Population	In the vicinity of EGLIN MAIN BASE		In the vicinity of DUKE FIELD		In the vicinity of CHOCTAW FIELD	
65–69	1,444	879	↓ 109	564	↑ 563	1	↓ 1
70–74	493	488	↓ 147	4	↑ 4	1	↑ 1
75–79	199	199	↑ 25	0	0	0	0
80–84	0	0	0	0	0	0	0
85+	0	0	0	0	0	0	0
TOTAL >65 dB DNL	**2,136**	**1,566**	**↓ 231**	**568**	**↑ 567**	**2**	**0**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Overall, Alternative 2A would affect 336 more residents with noise levels above 65 dB DNL compared with the No Action Alternative, since more residents in the vicinity of Duke Field would be exposed to these noise levels. The number of residents affected by these noise levels in the vicinity of Eglin Main Base would decrease by 231 as compared with the No Action Alternative.

As discussed in Alternative 1A, aircraft noise does have the potential to impact property values. However, other factors, such as property improvements, neighborhood quality, and the conditions of the local real estate market, are more influential on property values than aircraft noise. With high noise levels, property values have the potential to be discounted approximately 0.5 to 0.6 percent for every decibel compared with a similar property that is not exposed to aircraft noise when all other factors, such as neighborhood characteristics and desirability, local real estate conditions, and quality of schools, are held constant (Nelson, 2003). Due to the reduction in noise at Eglin Main Base, potential impacts on property values may occur, but these impacts are not expected to affect as many residences as compared with the No Action Alternative or Alternative 1A.

Noise levels generated under Alternative 2A would not directly impact high tourist areas such as area beaches or coastlines; however, outdoor recreation could be disrupted by F-35 overflights and could be considered annoying to individuals engaged in outdoor recreation. Noise levels are not expected to discourage tourism. As described in Alternative 1A, the beddown of the JSF could generate additional tourism as the incoming population participates in the available recreational opportunities.

The F-35 flight operations are not anticipated to adversely affect civilian flight operations. Under Alternative 2A, Eglin Main Base runways, which currently support Eglin AFB operations as well as the Northwest Florida Regional Airport, would not be utilized for F-35 operations. Instead, Choctaw Field would be used as an auxiliary field. A precision instrument approach would be installed on the new runways to deconflict current instrument approach issues with the Bob Sikes Airport in Crestview, which specializes in general aviation. Therefore, adverse impacts on local airports are not anticipated from airfield operations under Alternative 2A.

Overall, potential adverse socioeconomic impacts may occur in regard to the F-35 noise levels and property values; however, it is anticipated that these potential impacts would be less in magnitude and intensity compared with the No Action Alternative or Alternative 1A. Beneficial impacts on the ROI are anticipated through the increase in employment, revenues, and economic activity due to the increase in population and expenditures, including the temporary beneficial impacts resulting from construction activities. No significant impacts on tourism, airport operations, or other economic concerns are anticipated.

Environmental Justice

The FAA and DoD have identified residential use as incompatible with noise levels above 65 dB DNL, unless special measures are taken to reduce interior noise levels for affected residences. Residential use is identified as incompatible regardless of noise attenuation at noise levels greater than 75 dB DNL (see Appendix E, *Noise*). Therefore, the environmental justice analysis focuses on off-base residents potentially affected by noise levels greater than 65 dB DNL.

Table 4-54 and Figure 4-58 show the minority and low-income populations impacted by adverse noise levels of 65 dB DNL and above in the vicinity of Eglin Main Base and Duke Field. No minority or low-income persons would be affected by noise levels from Choctaw Field. Approximately 32.10 percent (685 residents) of the total off-base population affected by noise levels greater than 65 dB DNL would be minority and 2.86 percent (61 residents) would be low income as compared with 19 percent for minority and 9 percent for low-income populations in Okaloosa County. While the proportion of the affected minority population is higher than the total share in Okaloosa County, the higher level of affected populations of concern is primarily the result of Duke Field aircraft overflight of incarcerated persons at the Okaloosa Correctional Institute and the Okaloosa Youth Academy, an alternative school for at-risk youth.

Table 4-54. Affected Populations of Concern, Alternative 2A

dB Level	*Minority*				*Low-Income*			
	Percent (Number) W/ Census Tract 203.02 Blk 1197		**Percent (Number) W/Out Census Tract 203.02 Blk 1197**		**Percent (Number) W/ Census Tract 203.02 Blk 1197**		**Percent (Number) W/Out Census Tract 203.02 Blk 1197**	
Total Eglin and Duke Vicinity								
Total ≥65 dB DNL	**32.10%**	**(685)**	**21.65%**	**(339)**	**2.86%**	**(61)**	**0.00%**	**(0)**
65–69 dB DNL	37.91%	(547)	23.09%	(203)	4.23%	(61)	0.00%	(0)
70–74 dB DNL	21.54%	(106)	21.31%	(104)	0.00%	(0)	0.00%	(0)
75–79 dB DNL	16.08%	(32)	16.08%	(32)	0.00%	(0)	0.00%	(0)
80–84 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Eglin Air Force Base Vicinity								
Total ≥65 dB DNL	**21.65%**	**(339)**	**21.65%**	**(339)**	**0.00%**	**(0)**	**0.00%**	**(0)**
65–69 dB DNL	23.09%	(203)	23.09%	(203)	0.00%	(0)	0.00%	(0)
70–74 dB DNL	21.31%	(104)	21.31%	(104)	0.00%	(0)	0.00%	(0)
75–79 dB DNL	16.08%	(32)	16.08%	(32)	0.00%	(0)	0.00%	(0)
80–84 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Duke Field Vicinity								
Total ≥65 dB DNL	**60.92%**	**(346)**	**0.00%**	**(0)**	**10.74%**	**(61)**	**0.00%**	**(0)**
65–69 dB DNL	60.99%	(344)	0.00%	(0)	10.82%	(61)	0.00%	(0)
70–74 dB DNL	50.00%	(2)	0.00%	(0)	0.00%	(0)	0.00%	(0)
75–79 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
80–84 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)

≥ = greater than or equal to; Blk = block ; dB = decibels; DNL = day-night average sound level; W/ = with

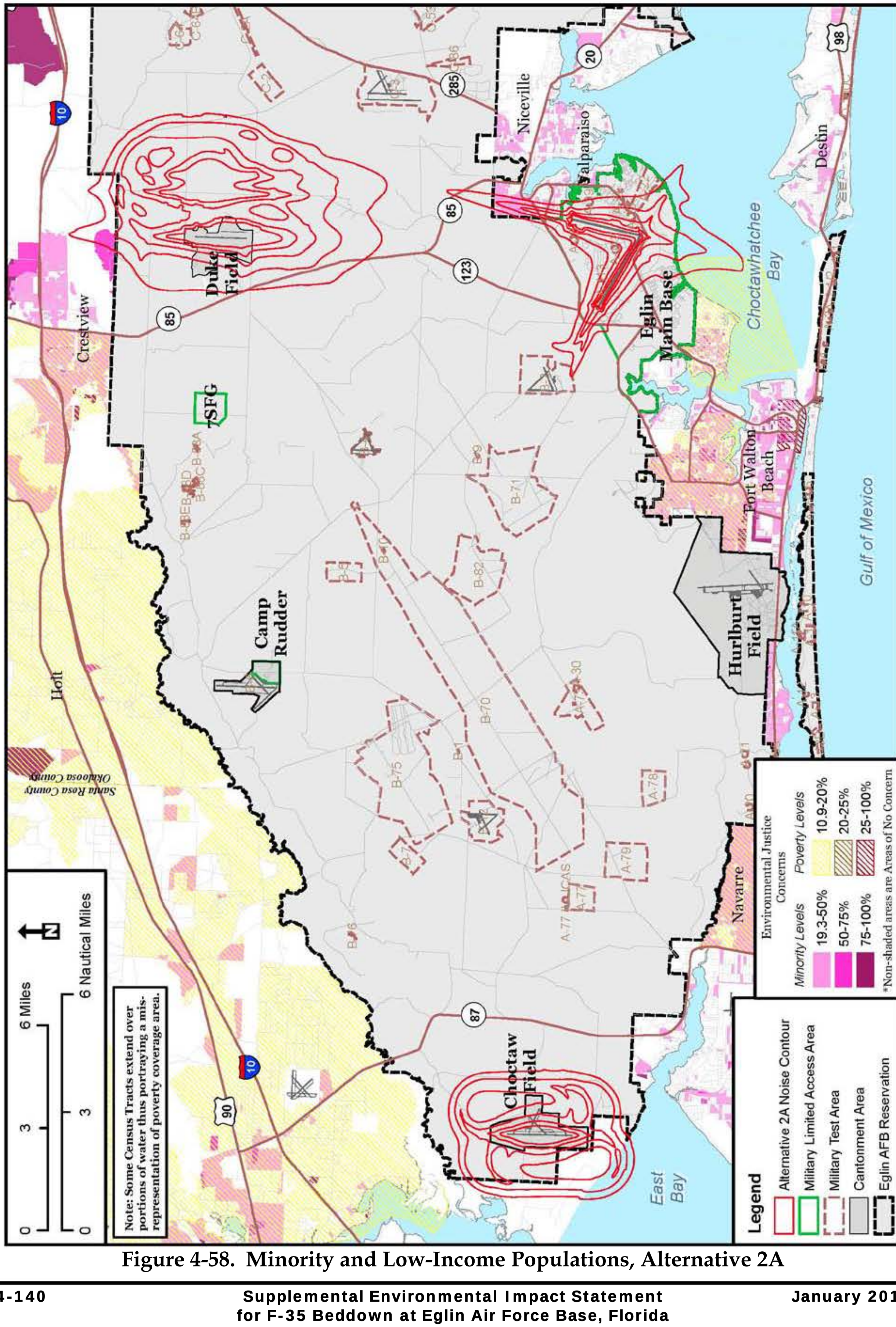


Figure 4-58. Minority and Low-Income Populations, Alternative 2A

Environmental justice analysis conducted separately at Eglin Main Base and Duke Field indicated potentially disproportionate concentrations of minority populations in the vicinity of Duke Field (Figure 4-58). As a result of the incarcerated population noted above, minority populations in the vicinity of Duke Field would comprise 60.92 percent (346 minority residents out of 568 total residents) of the total population in the vicinity of Duke Field impacted by noise levels of 65 dB DNL. The Okaloosa Correctional Institute and the Okaloosa Youth Academy are located in one census block that contained a disproportionate share of minorities: Census Tract 203.02, Block 1197. The calculations in Table 4-54 are shown with and without Census Tract 203.02, Block 1197, for comparison purposes.

The Okaloosa Correctional Institute and the Okaloosa Youth Academy are built of heavier construction materials, and provide more noise attenuation than a typical house or office building. These incarceration facilities could be exposed to noise levels between 65 and 74 dB DNL and are categorized as government services. According to FAA and DoD land use compatibilities, government service facilities are compatible between 65 and 69 dB DNL without noise attenuation. Noise levels between 70 and 74 dB DNL require NLR measures providing 25 dB of attenuation to be considered compatible. The existing construction and structure of the facilities at the Okaloosa Correctional Institute and the Okaloosa Youth Academy are expected to provide the 25 dB noise attenuation.

Under Alternative 2A, approximately 23.6 percent of the population affected by noise levels greater than 65 dB DNL is children under the age of 18, which is comparable to the share of children in the total population of Okaloosa County (22.2 percent). In addition, one school and one daycare could be exposed to noise levels above 65 dB DNL (Figure 4-59). The Valparaiso First Assembly of God Pre-School could be exposed to noise levels between 65 and 69 dB DNL while the Childcare Network daycare could be exposed to noise levels between 75 and 80 dB DNL.

Noise levels between 65 and 69 dB DNL would remain compatible with educational services if NLR measures up to 25 dB are implemented, and noise levels between 70 and 74 dB DNL would remain compatible by implementing up to 30 dB of NLR measures. The Childcare Network daycare could be exposed to noise levels greater than 75 dB DNL. Therefore, the noise levels generated by 59 aircraft without flight limitations could have adverse impacts to children. Additional detail concerning noise and the potential for interference with learning in terms of ANSI's *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools* is provided in Section 4.3, *Noise*.

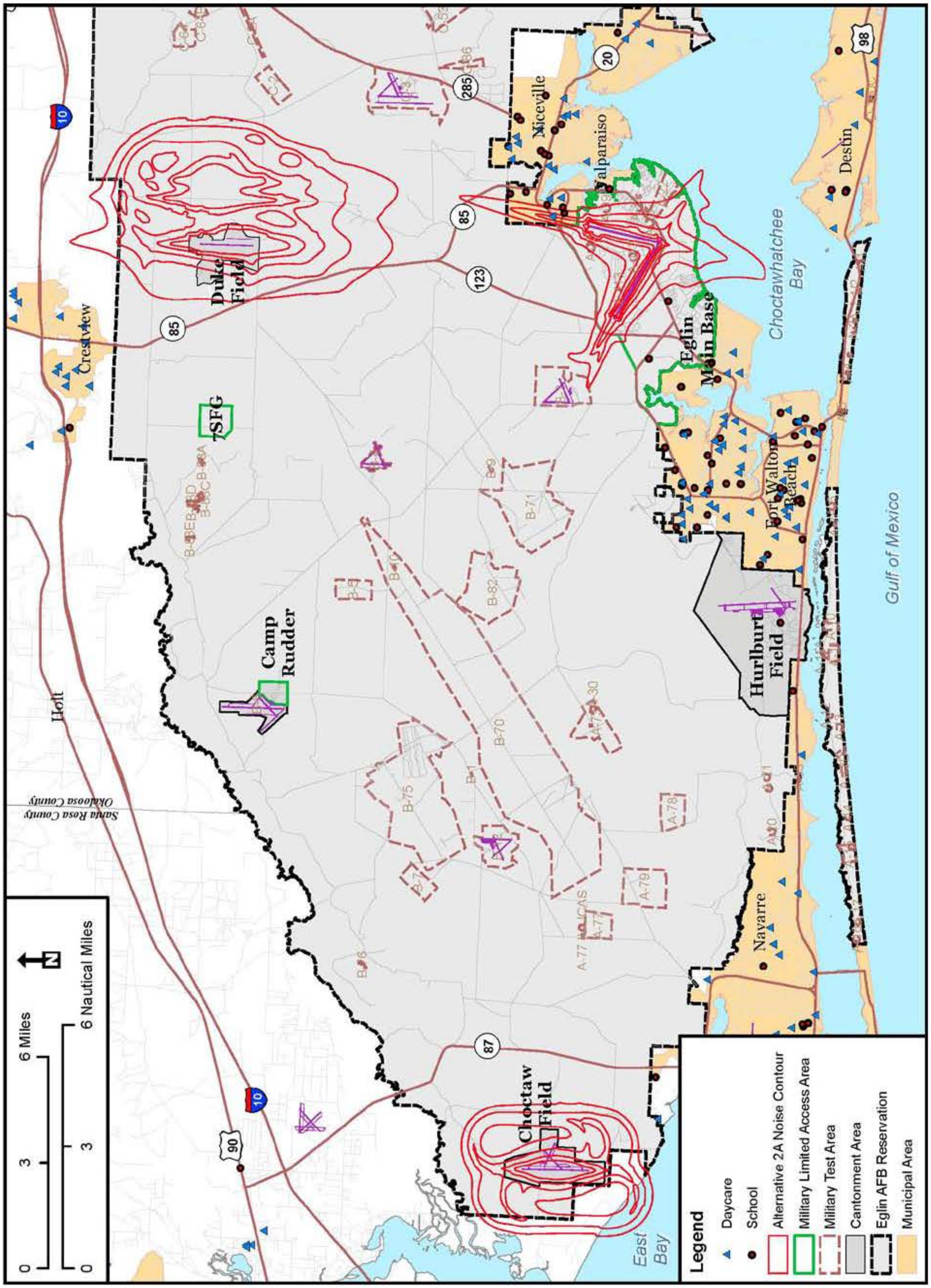


Figure 4-59. Schools and Daycares, Alternative 2A

4.5.2.2 *Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12*

Flight Operations

Under Alternative 2B, the 59 F-35 aircraft would utilize Duke Field and one new proposed runway for most operations. Choctaw Field and RW 12 of Eglin Main Base would be used as auxiliary fields. Table 4-55 presents the number of residents in the vicinity of Eglin Main Base and Duke Field potentially impacted by noise levels above 65 dB DNL. As discussed in Section 4.3, *Noise*, under this Alternative, no JSF flight operations would be conducted at Eglin Main Base. However, flight operations from Duke Field would expose some residents in the vicinity of Eglin Main Base to JSF noise.

Under Alternative 2B, a total of 684 additional residents in the vicinity of Duke Field and Eglin Main Base would be impacted by noise levels greater than 65 dB DNL compared with the No Action Alternative. An additional 19 residents in the vicinity of Eglin Main Base would be impacted by noise levels between 80 and 84 dB DNL under Alternative 2B compared with the No Action Alternative. No residents in the vicinity of Choctaw Field would be impacted by noise levels greater than 65 dB DNL.

Table 4-55. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 2B

Average Noise Levels (dB)	TOTAL Affected OFF-Base Population	In the vicinity of EGLIN MAIN BASE	In the vicinity of DUKE FIELD	In the vicinity of CHOCTAW FIELD
65–69	1,583	1,016 ↑ 28	567 ↑ 566	0 ↓ 2
70–74	664	664 ↑ 29	0 ■ 0	0 ■ 0
75–79	216	216 ↑ 42	0 ■ 0	0 ■ 0
80–84	19	19 ↑ 19	0 ■ 0	0 ■ 0
85+	0	0 ■ 0	0 ■ 0	0 ■ 0
TOTAL >65 dB DNL	**2,482**	**1,915 ↑ 118**	**567 ↑ 566**	**0 ↓ 2**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Property values could be adversely impacted by high noise levels. While other factors, such as property improvements, neighborhood quality, and the state of the local real estate market, are more influential on property value than aircraft noise, some studies have indicated that property values have the potential to be discounted approximately 0.5 to 0.6 percent for every decibel compared with a similar property not exposed to aircraft noise when all other factors, such as neighborhood characteristics and desirability, local real estate conditions, and quality of schools, are held constant (Nelson, 2003). Given the extent of the change in noise levels and the magnitude of the noise levels impacting residents, there may be the potential for impacts to property values under Alternative 2B.

Potential impacts on tourism and airport operations would be similar to those described under the No Action Alternative or Alternative 1A. The potential for congestion on the common runways between Eglin Main Base and the Northwest Florida Regional Airport would be less than that described under the No Action Alternative, as only one runway of Eglin Main Base would be used as an auxiliary field.

Potential adverse socioeconomic impacts are anticipated in regard to the impacts of high noise levels and property values. Beneficial impacts would result from the increase in employment, revenues, and economic activity, as well as temporary beneficial impacts from construction expenditures. No significant adverse impacts on tourism, airport operations, or other economic concerns are anticipated.

Environmental Justice

The FAA and DoD have identified residential use as incompatible with noise levels above 65 dB DNL unless special measures are taken to reduce interior noise levels for affected residences. Residential use is identified as incompatible regardless of noise attenuation at noise levels greater than 75 dB DNL (see Appendix E, *Noise*). Therefore, the environmental justice analysis focuses on off-base residents potentially affected by noise levels greater than 65 dB DNL.

Table 4-56 and Figure 4-60 show the minority and low-income populations impacted by adverse noise levels of 65 dB DNL and above. No minority or low-income populations in the vicinity of Choctaw Field would be affected by these noise levels. Approximately 30.6 percent (759 residents) of the total off-base population affected by noise levels greater than 65 dB DNL would be minority and 9.4 percent (232 residents) would be low income as compared with 19 percent minority and 9 percent low-income in Okaloosa County.

While the proportion of the affected minority population is higher than the total share in Okaloosa County, the higher level of affected minority populations is primarily the result of Duke Field aircraft overflight of incarcerated persons at the Okaloosa Correctional Institute and the Okaloosa Youth Academy, an alternative school for at-risk youth.

Table 4-56. Affected Populations of Concern, Alternative 2B

dB Level	*Minority*				*Low-Income*			
	Percent (Number) W/ Census Tract 203.02 Blk 1197		**Percent (Number) W/Out Census Tract 203.02 Blk 1197**		**Percent (Number) W/ Census Tract 203.02 Blk 1197**		**Percent (Number) W/Out Census Tract 203.02 Blk 1197**	
Total Eglin and Duke Vicinity								
Total ≥65 dB DNL	**30.58%**	**(759)**	**21.62%**	**(414)**	**9.35%**	**(232)**	**8.93%**	**(171)**
65–69 dB DNL	36.83%	(583)	23.43%	(238)	9.54%	(151)	8.86%	(90)
70–74 dB DNL	20.63%	(137)	20.63%	(137)	9.49%	(63)	9.49%	(63)
75–79 dB DNL	16.67%	(36)	16.67%	(36)	7.41%	(16)	7.41%	(16)
80–84 dB DNL	15.79%	(3)	15.79%	(3)	10.53%	(2)	10.53%	(2)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Eglin AFB Vicinity								
Total ≥65 dB DNL	**21.62%**	**(414)**	**21.62%**	**(414)**	**8.93%**	**(171)**	**8.93%**	**(171)**
65–69 dB DNL	23.43%	(238)	23.43%	(238)	8.86%	(90)	8.86%	(90)
70–74 dB DNL	20.63%	(137)	20.63%	(137)	9.49%	(63)	9.49%	(63)
75–79 dB DNL	16.67%	(36)	16.67%	(36)	7.41%	(16)	7.41%	(16)
80–84 dB DNL	15.79%	(3)	15.79%	(3)	10.53%	(2)	10.53%	(2)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Duke Field Vicinity								
Total ≥65 dB DNL	**60.85%**	**(345)**	**0.00%**	**(0)**	**10.76%**	**(61)**	**0.00%**	**(0)**
65–69 dB DNL	60.85%	(345)	0.00%	(0)	10.76%	(61)	0.00%	(0)
70–74 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
75–79 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
80–84 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)

≥ = greater than or equal to; AFB = Air Force Base; Blk = block ; dB = decibels; DNL = day-night average sound level; W/ = with

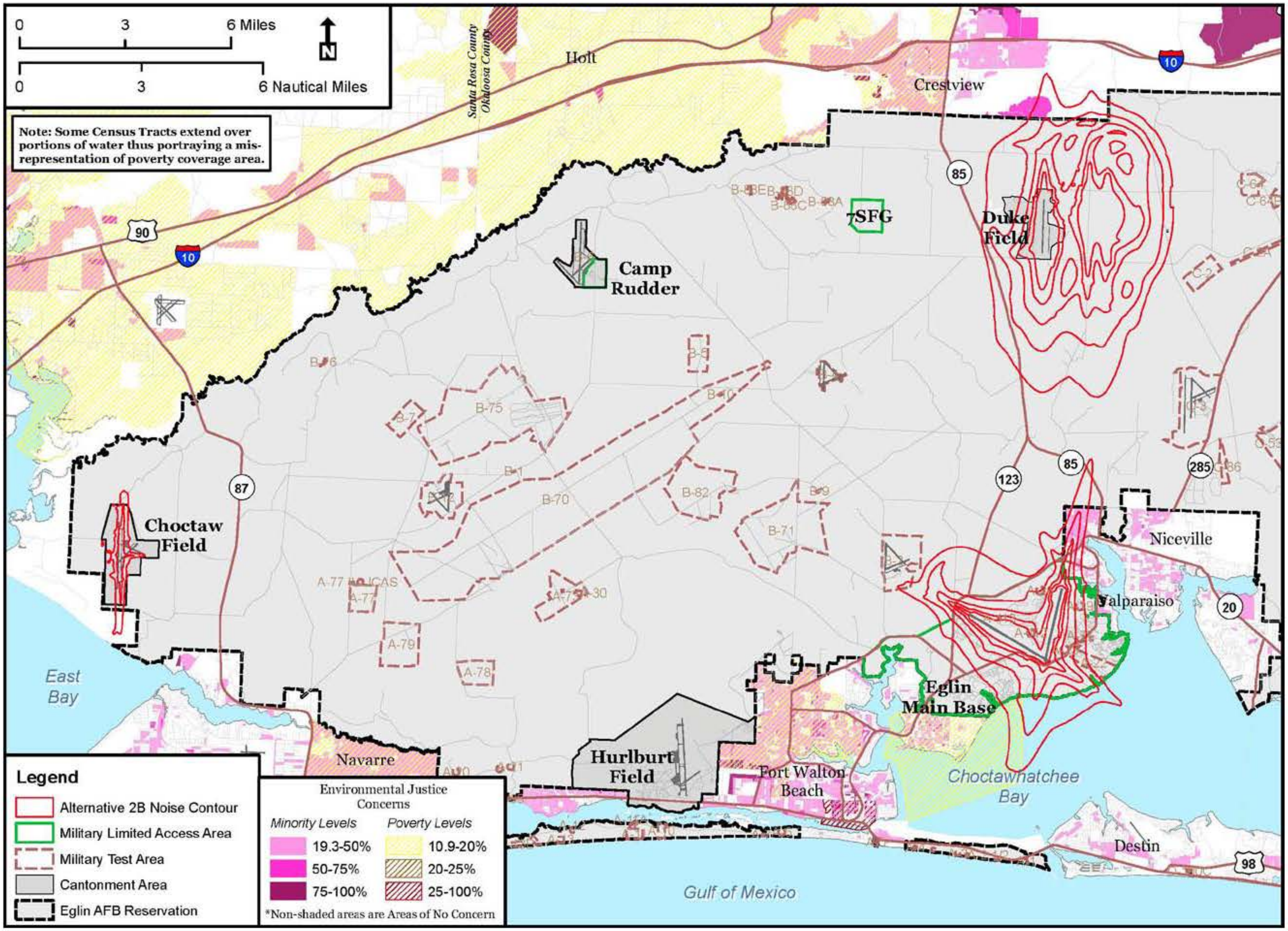


Figure 4-60. Minority and Low-Income Populations, Alternative 2B

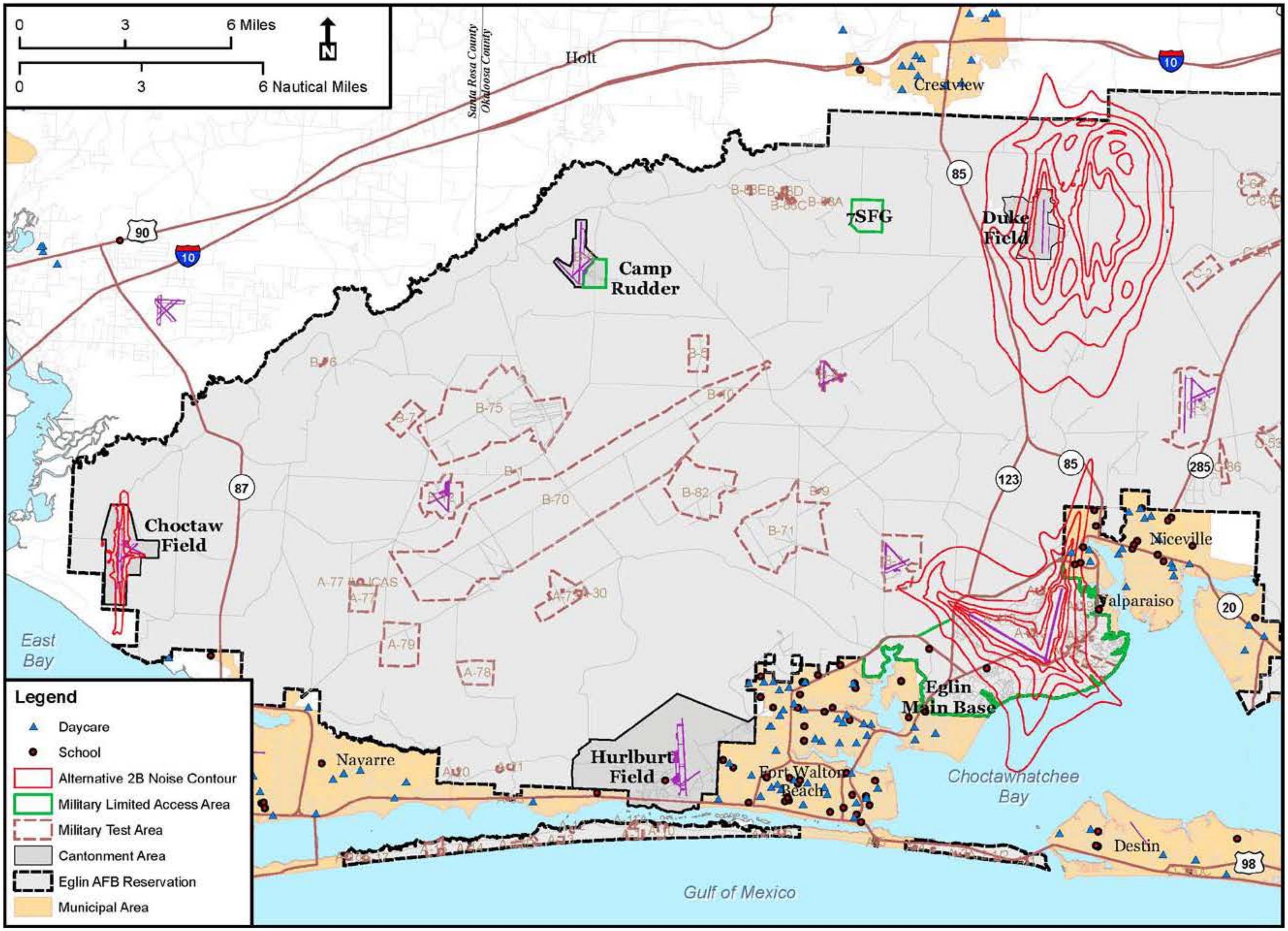
Environmental justice analysis conducted separately at Eglin Main Base and Duke Field indicated potentially disproportionate concentrations of minority populations in the vicinity of Duke Field (Figure 4-60). As a result of the incarcerated population noted above, minority populations in the vicinity of Duke Field would comprise 60.85 percent (345 minority residents out of 567 total residents) of the total population in the vicinity of Duke Field impacted by noise levels of 65 dB DNL. The Okaloosa Correctional Institute and the Okaloosa Youth Academy are located in one census block that contained a disproportionate share of minorities: Census Tract 203.02, Block 1197. The calculations in Table 4-56 are shown with and without Census Tract 203.02, Block 1197, for comparison purposes.

The Okaloosa Correctional Institute and the Okaloosa Youth Academy are built of heavier construction materials, and provide more noise attenuation than a typical house or office building. These incarceration facilities could be exposed to noise levels between 65 and 69 dB DNL and are categorized as government services. According to FAA and DoD land use compatibilities, government service facilities are compatible between 65 and 69 dB DNL without noise attenuation.

Children would comprise approximately 23.7 percent of the total population affected by noise levels greater than 65 dB DNL which is comparable to the 22.2 percent of the total population children comprise in Okaloosa County. Three schools could be exposed to noise levels between 65 and 69 dB DNL (Figure 4-61). The Okaloosa STEMM Center, Eglin Elementary, and Valparaiso First Assembly of God preschool could be exposed to noise levels below 70 dB DNL. In addition to the schools, the Childcare Network daycare could be exposed to noise levels between 75 and 79 dB DNL.

As discussed under the No Action Alternative and Alternative 1A, schools and daycares are considered compatible with noise levels up to 75 dB DNL with additional noise attenuation. For noise levels above 75 dB DNL, educational services are not compatible regardless of noise attenuation. Additionally, these noise levels are not compatible with outdoor use and could contribute to hearing loss in children regularly exposed to the aircraft noise. Therefore, the noise levels generated under Alternative 2B could have adverse impacts on children, which may be considered significant. Additional detail concerning noise and the potential for interference with learning in terms of ANSI's *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools* is provided in Section 4.3, *Noise*.

Figure 4-61. Schools and Daycares, Alternative 2B



4.5.2.3 *Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field*

Flight Operations

Table 4-57 presents the number of residents in the vicinity of Eglin Main Base and Duke Field potentially impacted by noise levels above 65 dB DNL. As discussed in Section 4.3, *Noise*, under this Alternative, no JSF flight operations would be conducted at Eglin Main Base. However, flight operations from Duke Field would expose some residents in the vicinity of Eglin Main Base to JSF noise.

Table 4-57. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 2C

Average Noise Levels (dB)	TOTAL Affected OFF-Base Population	In the vicinity of EGLIN MAIN BASE		In the vicinity of DUKE FIELD		In the vicinity of CHOCTAW FIELD	
65–69	1,552	1,017	↑ 29	534	↑ 533	1	↓ 1
70–74	672	671	↑ 36	0	0	1	↑ 1
75–79	212	212	↑ 38	0	0	0	0
80–84	17	17	↑ 17	0	0	0	0
85+	0	0	0	0	0	0	0
TOTAL >65 dB DNL	**2,453**	**1,917**	**↑ 120**	**534**	**↑ 533**	**2**	**0**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Under Alternative 2C, a total of 653 additional residents in the vicinity of Duke Field, Choctaw Field, and Eglin Main would be impacted by noise levels greater than 65 dB DNL compared with the No Action Alternative. No residents would be impacted by noise levels above 85 dB DNL; however, 17 residents in the vicinity of Eglin Main would be impacted by noise levels between 80 and 84 dB DNL.

As discussed under the previous alternatives, property values could be adversely impacted by high noise levels. Other conditions, such as the local real estate market and individual characteristics of the property, are more influential on values than aircraft noise. However, studies have indicated that aircraft noise can be linked to a discount of 0.5 to 0.6 percent for every decibel compared with a similar property not exposed to aircraft noise when all other factors, such as neighborhood characteristics and desirability, local real estate conditions, and quality of schools, are held constant (Nelson, 2003). Given the extent of the change in noise levels and the magnitude of the noise levels impacting residents, there may be the potential for aircraft noise to impact property values under Alternative 2C.

Potential impacts on tourism and airport operations would be similar to those described under the No Action Alternative or Alternative 1A. The potential for congestion on the common runways between Eglin Main Base and the Northwest Florida Regional Airport would be less than that described under the No Action Alternative, as only one runway of Eglin Main Base would be used as an auxiliary field.

Potential adverse socioeconomic impacts are anticipated in regard to the impacts of high noise levels and property values. Beneficial impacts would result from the increase in employment, revenues, and economic activity as well as temporary beneficial impacts from construction expenditures. No significant adverse impacts on tourism, airport operations, or other economic concerns are anticipated.

Environmental Justice

The FAA and DoD have identified residential use as incompatible with noise levels above 65 dB DNL unless special measures are taken to reduce interior noise levels for affected residences. Residential use is identified as incompatible regardless of noise attenuation at noise levels greater than 75 dB DNL (see Appendix E). Therefore, the environmental justice analysis focuses on off-base residents potentially affected by noise levels greater than 65 dB DNL.

Table 4-58 and Figure 4-62 show the minority and low-income populations impacted by adverse noise levels of 65 dB DNL and above. No minority or low-income populations in the vicinity of Choctaw Field would be affected by these noise levels. Approximately 30.19 percent (740 residents) of the total off-base population affected by noise levels greater than 65 dB DNL would be minority and 9.30 percent (228 residents) would be low income. While the proportion of the affected minority population is higher than the total share in Okaloosa County, the higher level of affected low-income and minority populations is primarily the result of Duke Field aircraft overflight of incarcerated persons at the Okaloosa Correctional Institute and the Okaloosa Youth Academy, an alternative school for at-risk youth.

Environmental justice analysis conducted separately at Eglin Main Base and Duke Field indicated potentially disproportionate concentrations of minority populations in the vicinity of Duke Field (Figure 4-62). As a result of the incarcerated population noted above, minority populations in the vicinity of Duke Field would comprise 61.05 percent (326 minority residents out of 534 total residents) of the total population in the vicinity of Duke Field impacted by noise levels of 65 dB DNL. The Okaloosa Correctional Institute and the Okaloosa Youth Academy are located in one census block that contained a disproportionate share of minorities: Census Tract 203.02, Block 1197. The calculations in Table 4-58 are shown with and without Census Tract 203.02, Block 1197, for comparison purposes.

The Okaloosa Correctional Institute and the Okaloosa Youth Academy are built of heavier construction materials and provide more noise attenuation than a typical house or office building. These incarceration facilities could be exposed to noise levels between 65 and 69 dB DNL and are categorized as government services. According to FAA and DoD land use compatibilities, government service facilities are compatible between 65 and 69 dB DNL without noise attenuation.

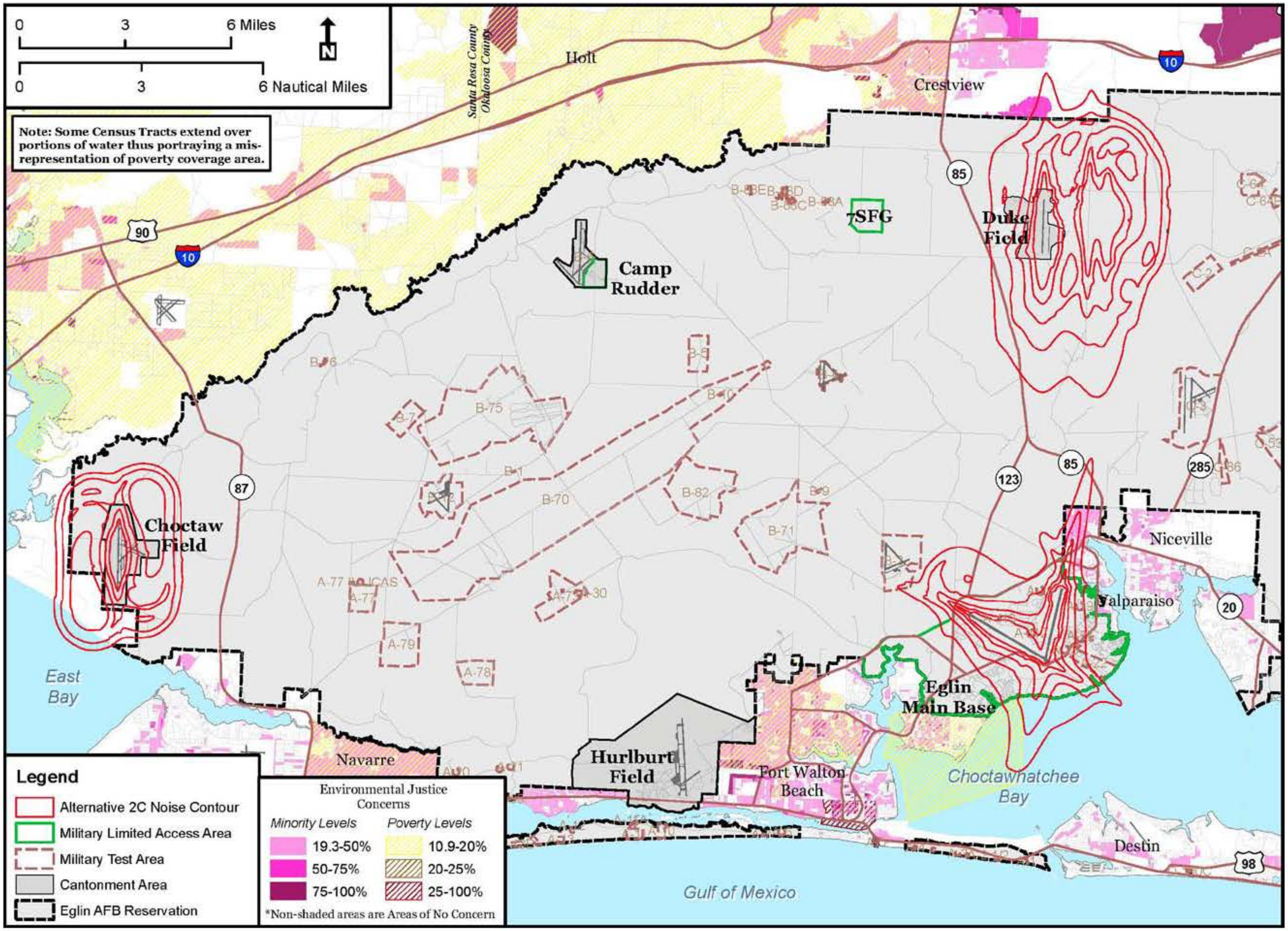
Table 4-58. Affected Populations of Concern, Alternative 2C

dB Level	*Minority*				*Low-Income*			
	Percent (Number) W/ Census Tract 203.02 Blk 1197		Percent (Number) W/Out Census Tract 203.02 Blk 1197		Percent (Number) W/ Census Tract 203.02 Blk 1197		Percent (Number) W/Out Census Tract 203.02 Blk 1197	
Total Eglin and Duke Vicinity								
Total ≥65 dB DNL	**30.19%**	**(740)**	**21.60%**	**(414)**	**9.30%**	**(228)**	**8.87%**	**(170)**
65–69 dB DNL	36.36%	(564)	23.40%	(238)	9.54%	(148)	8.85%	(90)
70–74 dB DNL	20.57%	(138)	20.57%	(138)	9.54%	(64)	9.54%	(64)
75–79 dB DNL	16.51%	(35)	16.51%	(35)	7.08%	(15)	7.08%	(15)
80–84 dB DNL	17.65%	(3)	17.65%	(3)	5.88%	(1)	5.88%	(1)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Eglin AFB Vicinity								
Total ≥65 dB DNL	**21.60%**	**(414)**	**21.60%**	**(414)**	**8.87%**	**(170)**	**8.87%**	**(170)**
65–69 dB DNL	23.40%	(238)	23.40%	(238)	8.85%	(90)	8.85%	(90)
70–74 dB DNL	20.57%	(138)	20.57%	(138)	9.54%	(64)	9.54%	(64)
75–79 dB DNL	16.51%	(35)	16.51%	(35)	7.08%	(15)	7.08%	(15)
80–84 dB DNL	17.65%	(3)	17.65%	(3)	5.88%	(1)	5.88%	(1)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Duke Field Vicinity								
Total ≥65 dB DNL	**61.05%**	**(326)**	**0.00%**	**(0)**	**10.86%**	**(58)**	**0.00%**	**(0)**
65–69 dB DNL	61.05%	(326)	0.00%	(0)	10.86%	(58)	0.00%	(0)
70–74 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
75–79 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
80–84 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)

≥ = greater than or equal to; AFB = Air Force Base; Blk = block ; dB = decibels; DNL = day-night average sound level; W/ = with

Children under the age of 18 would comprise approximately 23.8 percent of the population affected by noise levels greater than 65 dB DNL. This is comparable to the share of total population children comprise in Okaloosa County. Three schools and one daycare could be exposed to noise levels greater than 65 dB DNL (Figure 4-63). The Okaloosa STEMM Center, Valparaiso First Assembly of God preschool, and Eglin Elementary could be exposed to noise levels between 65 and 69 dB DNL. The Childcare Network daycare could be exposed to noise levels between 75 and 79 dB DNL. As discussed in previous alternatives, educational services are compatible with noise levels up to 75 dB DNL with additional noise attenuation. The four schools exposed to noise levels between 65 and 69 dB DNL would remain compatible with educational services if NLR measures up to 25 dB are implemented. The daycare could be exposed to noise levels that are not compatible with educational services regardless of noise attenuation. Therefore, the noise levels generated under Alternative 2C could have adverse impacts on children.

Figure 4-62. Minority and Low-Income Populations, Alternative 2C



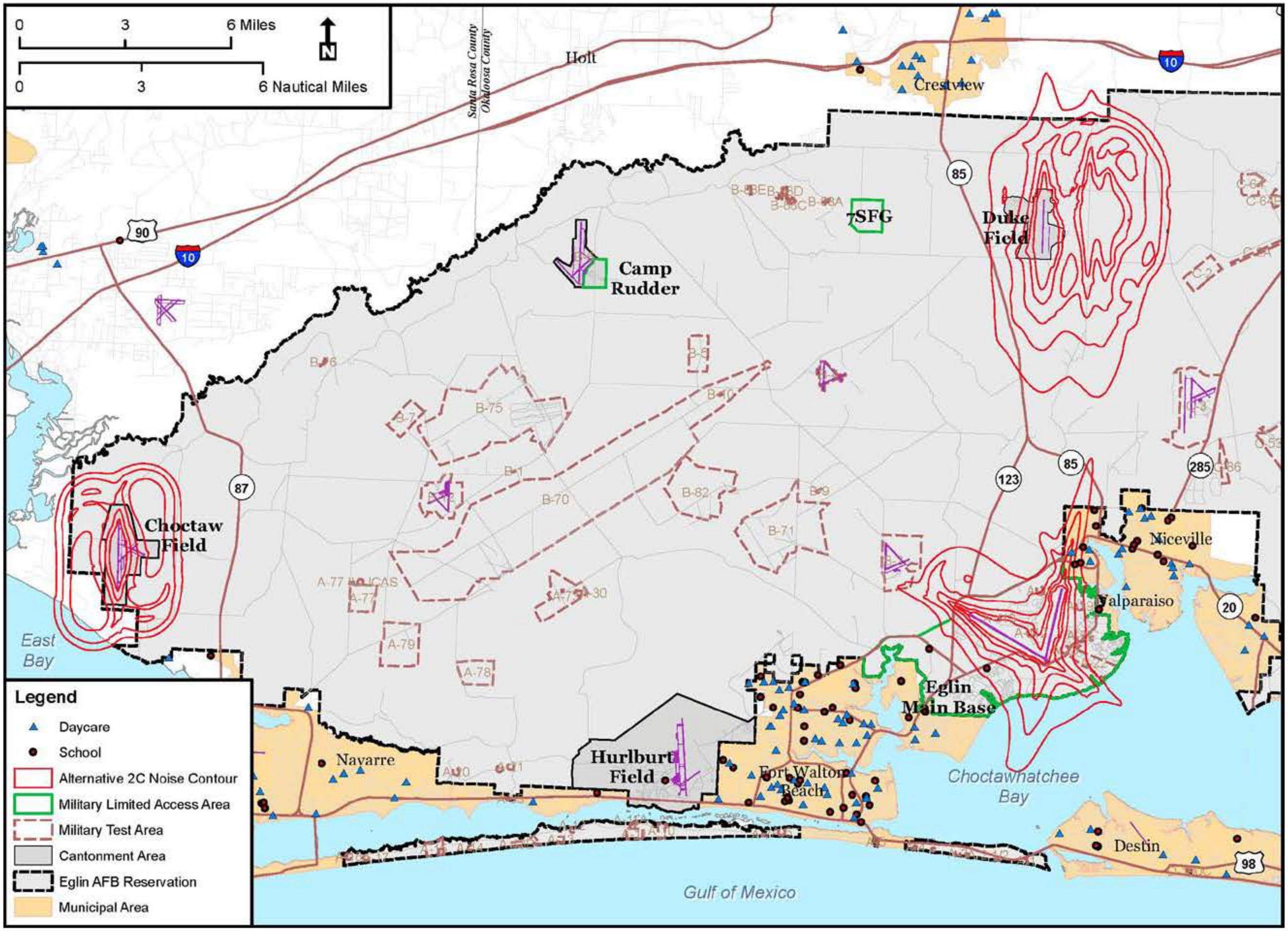


Figure 4-63. Schools and Daycares, Alternative 2C

Additional detail concerning noise and the potential for interference with learning in terms of ANSI's *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools* is provided in Section 4.3, *Noise*.

4.5.2.4 *Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field*

Flight Operations

Table 4-59 presents the number of residents in the vicinity of Eglin Main Base and Duke Field potentially impacted by noise levels above 65 dB DNL. As discussed in Section 4.3, *Noise*, under this Alternative, no JSF flight operations would be conducted at Eglin Main Base. However, flight operations from Duke Field would expose some residents in the vicinity of Eglin Main Base to JSF noise.

Table 4-59. Number of Residents Potentially Affected by Aircraft Noise in the Vicinity of Eglin Main Base, Duke Field, and Choctaw Field Under Alternative 2D

Average Noise Levels (dB)	TOTAL Affected OFF-Base Population	In the vicinity of EGLIN MAIN BASE		In the vicinity of DUKE FIELD		In the vicinity of CHOCTAW FIELD	
65–69	1,670	1,015	27 (increase)	654	653 (increase)	1	1 (decrease)
70–74	791	670	35 (increase)	120	120 (increase)	1	1 (increase)
75–79	229	229	55 (increase)	0	0 (no change)	0	0 (no change)
80–84	13	13	13 (increase)	0	0 (no change)	0	0 (no change)
85+	0	0	0 (no change)	0	0 (no change)	0	0 (no change)
TOTAL >65 dB DNL	**2,703**	**1,927**	**130** (increase)	**774**	**773** (increase)	**2**	**0** (no change)

Amount of increase/decrease/no change from No Action Alternative

Under Alternative 2D, a total of 903 additional residents in the vicinity of Duke Field and Eglin Main Base would be impacted by noise levels greater than 65 dB DNL compared with the No Action Alternative. One resident in the vicinity of Choctaw Field would be affected by higher noise levels as compared with the No Action Alternative. No residents would be impacted by noise levels above 85 dB DNL; however, 13 residents in the vicinity of Eglin Main Base would be impacted by noise levels between 80 and 84 dB DNL, compared with the No Action Alternative.

As discussed under the previous alternatives, property values could be adversely impacted by high noise levels. Other conditions, such as the local real estate market and individual characteristics of the property, are more influential on values than aircraft noise. However, studies have indicated that aircraft noise can be linked to a discount of 0.5 to 0.6 percent for every decibel compared with a similar property not exposed to aircraft noise when all other factors, such as neighborhood characteristics and desirability, local real estate conditions, and quality of schools, are held constant (Nelson, 2003). Given the extent of the change in noise levels and the magnitude of the noise levels impacting residents, there may be the potential that property values could be impacted by aircraft noise.

Potential impacts on tourism and airport operations would be similar to those described under the No Action Alternative or Alternative 1A. The potential for congestion on the common runways between Eglin Main Base and the Northwest Florida Regional Airport would be less than that described under the No Action Alternative, as only one runway of Eglin Main Base would be used as an auxiliary field.

Potential adverse socioeconomic impacts are anticipated in regard to the impacts of high noise levels and property values. Beneficial impacts would result from the increase in employment, revenues, and economic activity, as well as temporary beneficial impacts from construction expenditures. No significant adverse impacts on tourism, airport operations, or other economic concerns are anticipated.

Environmental Justice

The FAA and DoD have identified residential use as incompatible with noise levels above 65 dB DNL unless special measures are taken to reduce interior noise levels for affected residences. Residential use is identified as incompatible regardless of noise attenuation at noise levels greater than 75 dB DNL (see Appendix E). Therefore, the environmental justice analysis focuses on off-base residents potentially affected by noise levels greater than 65 dB DNL. For additional detail, the analysis considers the total number of off-base residents affected as well as the residents affected specifically by noise levels from Eglin Main Base and Duke Field. No minority or low-income populations in the vicinity of Choctaw Field would be affected by noise levels greater than 65 dB DNL.

Figure 4-64 and Table 4-60 show the minority and low-income populations impacted by adverse noise levels of 65 dB DNL and above. Approximately 32.77 percent (885 residents) of the total off-base population affected by noise levels greater than 65 dB DNL would be minority and 8.89 percent (240 residents) would be low income. The affected low-income population is comparable to the share of low-income population in the community of comparison. While the proportion of the affected minority population is higher than the total share in Okaloosa County, the higher level of affected low-income and minority populations is primarily the result of Duke Field aircraft overflight of incarcerated persons at the Okaloosa Correctional Institute and the Okaloosa Youth Academy, an alternative school for at-risk youth.

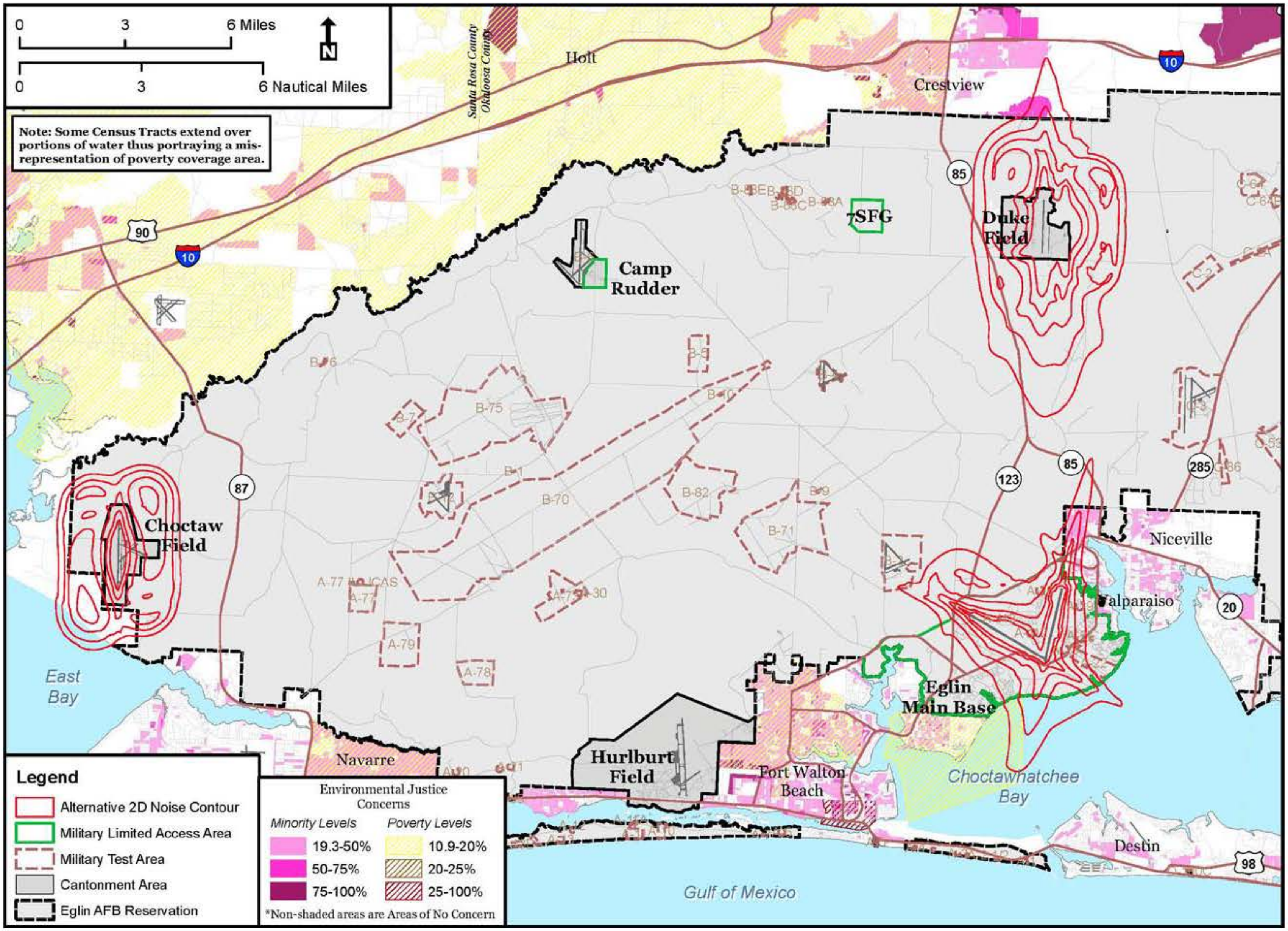


Figure 4-64. Minority and Low-Income Populations, Alternative 2D

Table 4-60. Affected Populations of Concern, Alternative 2D

dB Level	Minority				Low-Income			
	Percent (Number) W/ Census Tract 203.02 Blk 1197		Percent (Number) W/Out Census Tract 203.02 Blk 1197		Percent (Number) W/ Census Tract 203.02 Blk 1197		Percent (Number) W/Out Census Tract 203.02 Blk 1197	
Total Eglin and Duke Vicinity								
Total ≥65 dB DNL	**32.77%**	**(885)**	**21.63%**	**(419)**	**8.89%**	**(240)**	**8.83%**	**(171)**
65–69 dB DNL	37.93%	(633)	23.41%	(240)	8.93%	(149)	8.88%	(91)
70–74 dB DNL	26.84%	(212)	20.75%	(139)	9.37%	(74)	9.40%	(63)
75–79 dB DNL	16.59%	(38)	16.59%	(38)	6.99%	(16)	6.99%	(16)
80–84 dB DNL	15.38%	(2)	15.38%	(2)	7.69%	(1)	7.69%	(1)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Eglin AFB Vicinity								
Total ≥65 dB DNL	**21.64%**	**(417)**	**21.64%**	**(417)**	**8.82%**	**(170)**	**8.82%**	**(170)**
65–69 dB DNL	23.45%	(238)	23.45%	(238)	8.87%	(90)	8.87%	(90)
70–74 dB DNL	20.75%	(139)	20.75%	(139)	9.40%	(63)	9.40%	(63)
75–79 dB DNL	16.59%	(38)	16.59%	(38)	6.99%	(16)	6.99%	(16)
80–84 dB DNL	15.38%	(2)	15.38%	(2)	7.69%	(1)	7.69%	(1)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Duke Field Vicinity								
Total ≥65 dB DNL	**60.47%**	**(468)**	**20.00%**	**(2)**	**9.04%**	**(70)**	**10.00%**	**(1)**
65–69 dB DNL	60.40%	(395)	20.00%	(2)	9.02%	(59)	10.00%	(1)
70–74 dB DNL	60.83%	(73)	0.00%	(0)	9.17%	(11)	0.00%	(0)
75–79 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
80–84 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)

≥ = greater than or equal to; AFB = Air Force Base; Blk = block ; dB = decibels; DNL = day-night average sound level; W/ = with

Environmental justice analysis conducted separately at Eglin Main Base and Duke Field indicated potentially disproportionate concentrations of minority populations in the vicinity of Duke Field (Figure 4-64). As a result of the incarcerated population noted above, minority populations in the vicinity of Duke Field would comprise 47.8 percent (386 minority residents out of 807 total residents) of the total population impacted by noise levels of 65 dB DNL. The Okaloosa Correctional Institute and the Okaloosa Youth Academy are located in one census block that contained a disproportionate share of minorities: Census Tract 203.02, Block 1197. The calculations are shown with and without Census Tract 203.02, Block 1197, for comparison purposes.

The Okaloosa Correctional Institute and the Okaloosa Youth Academy are built of heavier construction materials, and provide more noise attenuation than a typical house or office building. These incarceration facilities could be exposed to noise levels between 65 and 79 dB DNL and are categorized as government services. According to FAA and DoD land use compatibilities, government service facilities are compatible between 65 and 69 dB DNL without noise attenuation. Noise levels between 70 and 74 dB DNL require NLR measures providing 25 dB of attenuation to be considered compatible. Noise levels between 75 and 79 dB DNL require NLR measures providing 30 dB of attenuation to be compatible. The existing construction and structure of the facilities at the Okaloosa Correctional Institute and the Okaloosa Youth Academy are expected to provide the 30 dB noise attenuation.

Children would comprise approximately 22.4 percent of the affected population, which is nearly the same proportion that children comprise in Okaloosa County as a whole. Three schools and one daycare in the vicinity of Eglin Main Base could be exposed to noise levels greater than 65 dB DNL (Figure 4-65). The First Assembly of God private school, Eglin Elementary School, and the Okaloosa STEMM Center could be exposed to noise levels between 65 and 69 dB DNL. The Childcare Network daycare center could be exposed to noise levels between 75 and 79 dB DNL. The Okaloosa County Youth Academy could be exposed to noise levels between 65 and 74 dB DNL.

As discussed in previous alternatives, educational services are compatible with noise levels up to 75 dB DNL with additional noise attenuation. The schools exposed to noise levels between 65 and 69 dB DNL would remain compatible with educational services if NLR measures up to 25 dB are implemented. The daycare could be exposed to noise levels that are not compatible with educational services regardless of noise attenuation. Therefore, the noise levels generated under Alternative 2D could have adverse impacts on children. Additional detail concerning noise and the potential for interference with learning in terms of ANSI's *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools* is provided in Section 4.3, *Noise*.

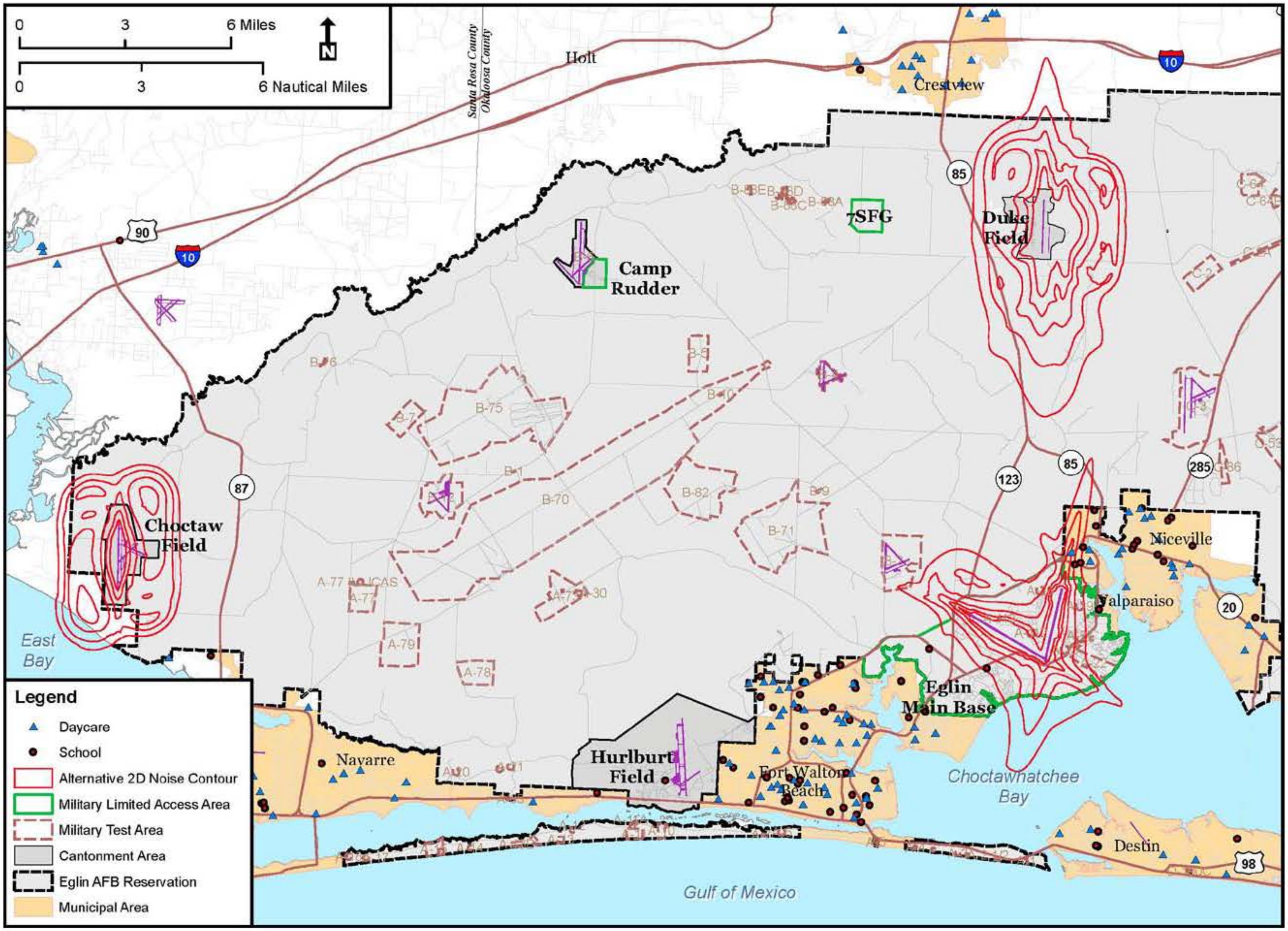


Figure 4-65. Schools and Daycares, Alternative 2D

4.5.2.5 *Alternative 2E – Duke Field Single Runway Plus Choctaw Field*

Flight Operations

Table 4-61 presents the number of residents in the vicinity of Eglin Main Base and Duke Field potentially impacted by noise levels above 65 dB DNL. As discussed in Section 4.3, *Noise*, under this Alternative, no JSF flight operations would be conducted at Eglin Main Base. However, flight operations from Duke Field would expose some residents in the vicinity of Eglin Main Base to JSF noise.

Table 4-61. Number of Residents Potentially Affected by Aircraft Noise Under Alternative 2E

Average Noise Levels (dB)	TOTAL Affected OFF-Base Population	In the vicinity of EGLIN MAIN BASE		In the vicinity of DUKE FIELD		In the vicinity of CHOCTAW FIELD	
65–69	1,540	861	↓ 127	678	↑ 677	1	↓ 1
70–74	633	482	↓ 153	150	↑ 150	1	↑ 1
75–79	198	198	↑ 24	0	■ 0	0	■ 0
80–84	0	0	■ 0	0	■ 0	0	■ 0
85+	0	0	■ 0	0	■ 0	0	■ 0
TOTAL >65 dB DNL	**2,371**	**1,541**	**↓ 256**	**828**	**↑ 827**	**2**	**■ 0**

↑ ↓ ■ Amount of increase/decrease/no change from No Action Alternative

Under Alternative 2E, a total of 571 additional residents in the vicinity of Duke Field and Eglin Main Base would be impacted by noise levels greater than 65 dB DNL compared with the No Action Alternative. No additional residents in the vicinity of Choctaw Field would be affected; however, one resident would be affected by higher noise levels as compared with the No Action Alternative. No residents would be impacted by noise levels above 80 dB DNL.

As discussed under previous alternatives, property values could be adversely impacted by high noise levels. Other conditions, such as the local real estate market and individual characteristics of the property, are more influential on values than aircraft noise. However, studies have indicated that aircraft noise can be linked to a discount of 0.5 to 0.6 percent for every decibel compared with similar property not exposed to aircraft noise when other factors such as neighborhood characteristics and desirability, local real estate conditions, and quality of schools are held constant (Nelson, 2003). Given the extent of the change in noise and the magnitude of the noise levels impacting residents, there may be the potential that property values could be impacted by aircraft noise.

Potential impacts on tourism would be similar to those described under the No Action Alternative or Alternative 1A. The potential for congestion on the common runways between Eglin Main Base and the Northwest Florida Regional Airport would be less than that described under the No Action Alternative, as the Eglin Main Base runways would not be used by the F-35.

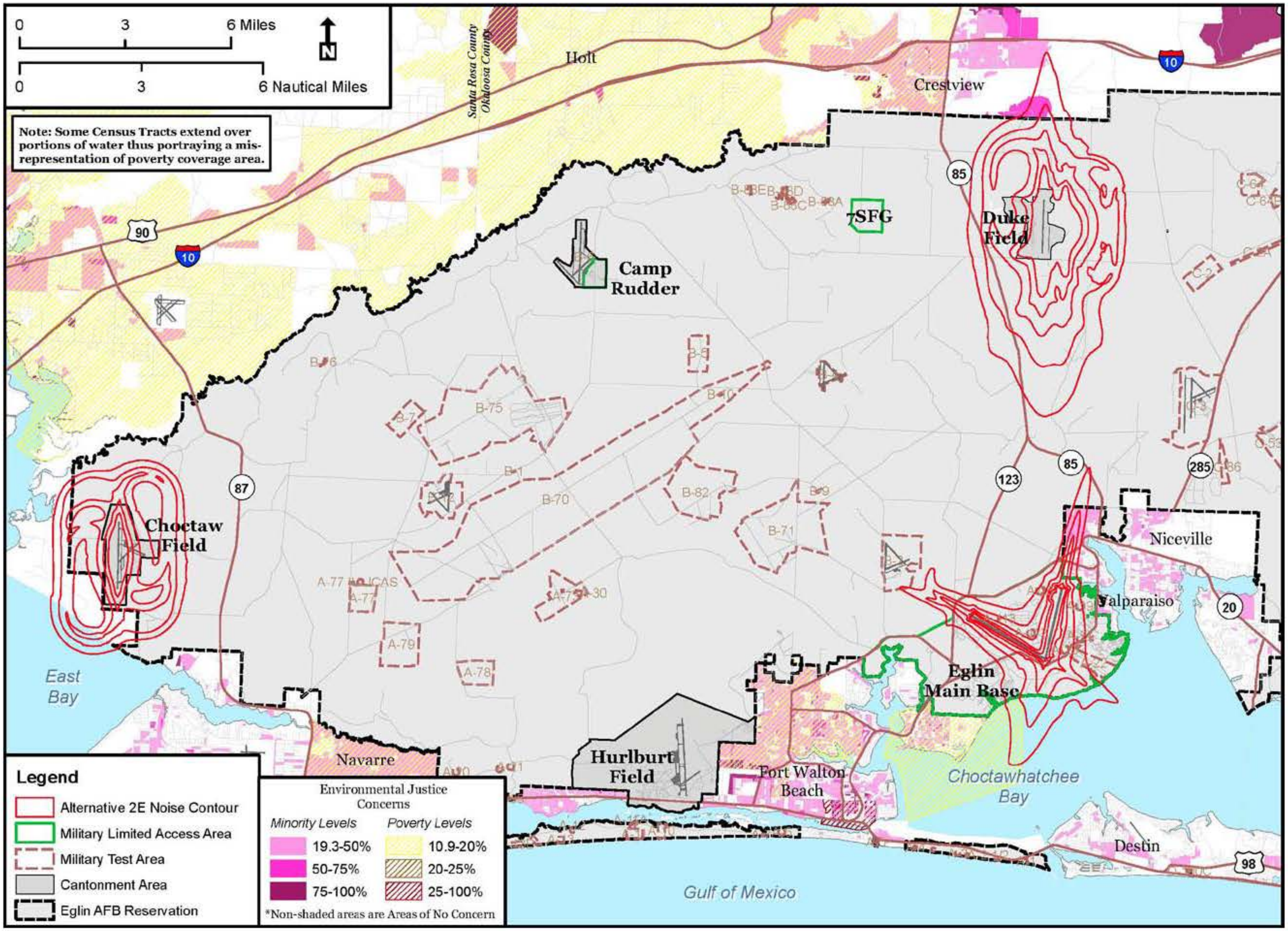
Potential adverse socioeconomic impacts are anticipated in regard to the impacts of high noise levels and property values. Beneficial impacts would result from the increase in employment, revenues, and economic activity, as well as temporary beneficial impacts from construction expenditures. No significant adverse impacts on tourism, airport operations, or other economic concerns are anticipated.

Environmental Justice

The FAA and DoD have identified residential use as incompatible with noise levels above 65 dB DNL unless special measures are taken to reduce interior noise levels for affected residences. Residential use is identified as incompatible regardless of noise attenuation at noise levels greater than 75 dB DNL (see Appendix E). Therefore, the environmental justice analysis focuses on off-base residents potentially affected by noise levels greater than 65 dB DNL. For additional detail, the analysis considers the total number of off-base residents affected as well as the residents affected specifically by noise levels from Eglin Main Base or noise levels from Duke Field. No minority or low-income populations in the vicinity of Choctaw Field would be affected by high noise levels.

Table 4-62 and Figure 4-66 show the minority and low-income populations impacted by adverse noise levels of 65 dB DNL and above. Approximately 35.08 percent (831 residents) of the total off-base population affected by noise levels greater than 65 dB DNL would be minority and 9.08 percent (215 residents) would be low income.

Figure 4-66. Minority and Low-Income Populations, Alternative 2E



While the proportion of the affected minority and low-income population is higher than the total share in Okaloosa County, the higher level of affected low-income and minority populations is primarily the result of Duke Field aircraft overflight of incarcerated persons at the Okaloosa Correctional Institute and the Okaloosa Youth Academy, an alternative school for at-risk youth.

Environmental justice analysis conducted separately at Eglin Main Base and Duke Field indicated potentially disproportionate concentrations of minority populations in the vicinity of Duke Field (Figure 4-66). As a result of the incarcerated population noted above, minority populations in the vicinity of Duke Field would comprise 60.14 percent (498 minority residents out of 881 total residents) of the total population impacted by noise levels of 65 dB DNL. The Okaloosa Correctional Institute and the Okaloosa Youth Academy are located in one census block that contained a disproportionate share of minorities: Census Tract 203.02, Block 1197. The calculations are shown with and without Census Tract 203.02, Block 1197, in Table 4-62 for comparison purposes.

Table 4-62. Affected Populations of Concern, Alternative 2E

dB Level	*Minority*				*Low-Income*			
	Percent (Number) W/ Census Tract 203.02 Blk 1197		**Percent (Number) W/Out Census Tract 203.02 Blk 1197**		**Percent (Number) W/ Census Tract 203.02 Blk 1197**		**Percent (Number) W/Out Census Tract 203.02 Blk 1197**	
Total Eglin and Duke Vicinity								
Total ≥65 dB DNL	**35.08%**	**(831)**	**21.65%**	**(338)**	**9.08%**	**(215)**	**9.10%**	**(142)**
65–69 dB DNL	39.31%	(605)	23.16%	(204)	8.97%	(138)	8.97%	(79)
70–74 dB DNL	30.70%	(194)	21.16%	(102)	9.49%	(60)	9.54%	(46)
75–79 dB DNL	16.16%	(32)	16.16%	(32)	8.59%	(17)	8.59%	(17)
80–84 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Eglin AFB Vicinity								
Total ≥65 dB DNL	**21.61%**	**(333)**	**21.61%**	**(333)**	**9.09%**	**(140)**	**9.09%**	**(140)**
65–69 dB DNL	23.11%	(199)	23.11%	(199)	8.94%	(77)	8.94%	(77)
70–74 dB DNL	21.16%	(102)	21.16%	(102)	9.54%	(46)	9.54%	(46)
75–79 dB DNL	16.16%	(32)	16.16%	(32)	8.59%	(17)	8.59%	(17)
80–84 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
Duke Field Vicinity								
Total ≥65 dB DNL	**60.14%**	**(498)**	**25.00%**	**(5)**	**9.06%**	**(75)**	**10.00%**	**(2)**
65–69 dB DNL	59.88%	(406)	25.00%	(5)	9.00%	(61)	10.00%	(2)
70–74 dB DNL	61.33%	(92)	0.00%	(0)	9.33%	(14)	0.00%	(0)
75–79 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
80–84 dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)
85+ dB DNL	0.00%	(0)	0.00%	(0)	0.00%	(0)	0.00%	(0)

≥ = greater than or equal to; AFB = Air Force Base; Blk = block ; dB = decibels; DNL = day-night average sound level; W/ = with

The Okaloosa Correctional Institute and the Okaloosa Youth Academy are built of heavier construction materials, and provide more noise attenuation than a typical house or office building. These incarceration facilities could be exposed to noise levels between 65 and 69 dB DNL and are categorized as government services. According to FAA and DoD land use compatibilities, government service facilities are compatible between 65 and 69 dB DNL without noise attenuation. Noise levels between 70 and 74 dB DNL require NLR measures providing 25 dB of attenuation to be considered compatible. Noise levels between 75 and 79 dB DNL require NLR measures providing 30 dB of attenuation to be compatible. The existing construction and structure of the facilities at the Okaloosa Correctional Institute and the Okaloosa Youth Academy are expected to provide the 30 dB noise attenuation.

Of the total population affected by noise levels greater than 65 dB DNL, children would comprise 22.2 percent. This proportion is the same proportion of children in the total population of Okaloosa County. One school and one daycare in the vicinity of Eglin Main Base could be exposed to noise levels greater than 65 dB DNL (Figure 4-67). The First Assembly of God private school could be exposed to noise levels between 65 and 69 dB DNL and the Okaloosa Youth Academy could be exposed to noise levels between 65 and 69 dB DNL. The Childcare Network daycare could be exposed to noise levels between 75 and 79 dB DNL. As discussed in previous alternatives, educational services are compatible with noise levels up to 75 dB DNL with additional noise attenuation.

The school exposed to noise levels between 65 and 69 dB DNL would remain compatible with educational services if NLR measures up to 25 dB are implemented. The daycare exposed to 75 dB to 79 dB DNL could be exposed to noise levels that are not compatible with educational services regardless of noise attenuation. Therefore, the noise levels generated under Alternative 2E could have adverse impacts on children.

Additional detail concerning noise and the potential for interference with learning in terms of ANSI's *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools* is provided in Section 4.3, *Noise*.

4.5.3 Mitigations

Because most of the potential impacts to socioeconomics are directly related to noise from the F-35 flight operations, please see Section 4.3.4 for mitigations related to noise. These mitigations may help ensure that impacts to socioeconomics are mitigated as well. No specific socioeconomics mitigations have been identified at this time. However, should appropriate mitigations be identified through the adaptive management process, the Air Force may choose to implement them at that time.

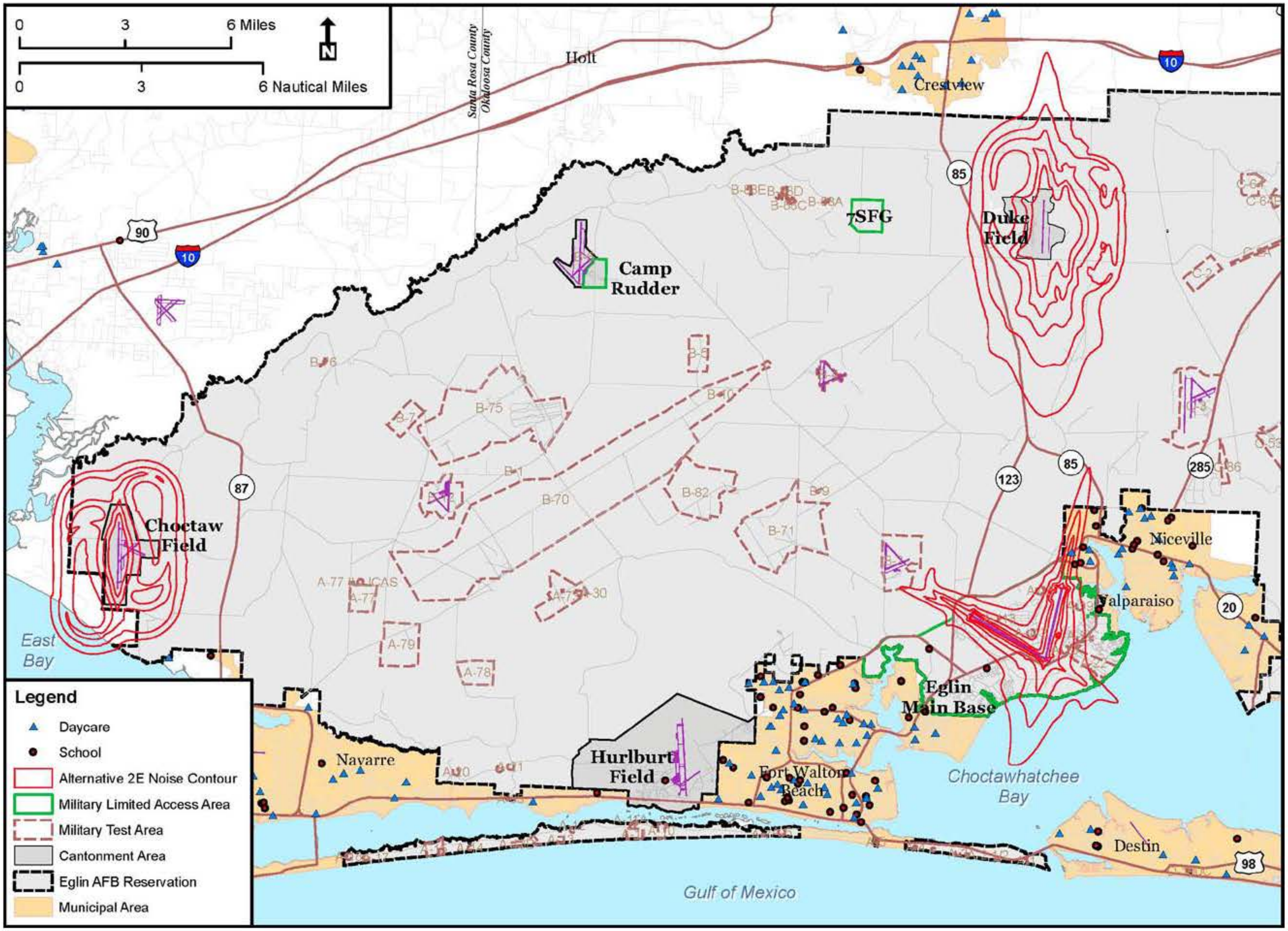


Figure 4-67. Schools and Daycares, Alternative 2E

4.6 TRANSPORTATION

Appendix B, *Transportation*, provides a general description of the transportation demand modeling process, trip generation, and inputs utilized for transportation impact analysis.

4.6.1 Alternative 1 – Eglin Main Base

The roadway traffic resulting from an alternative would be associated with personnel at the MOB, but not with F-35 flight activities at the auxiliary fields. Alternatives 1A and 1I assume that the MOB would be at Eglin Main Base, and most roadway traffic impacts would be the same under both alternatives. However, the location of a new runway under Alternative 1I may pose additional impacts on Hwy 85.

4.6.1.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

For ground traffic, Alternative 1A would have the same impact on the regional roadway network as the No Action Alternative.

4.6.1.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

The potential traffic impacts would be the same under Alternative 1I as the No Action Alternative and Alternative 1A. In addition, under Alternative 1I, the location of a new runway northwest of Hwy 85/Hwy 123, shown in Chapter 2 (Figure 2-15, *Notional Location of Alternative 1I Runway Construction*), may impact Hwy 85.

Hwy 85 is the main north/south corridor through Eglin AFB in Okaloosa County. It is the only public corridor crossing the Eglin Reservation entirely in Okaloosa County, and it provides an essential evacuation route for the coastal communities along U.S. Highway 98 (US 98) in the event of hurricanes or tropical storms. Currently, there are 34,000 annual average daily trips on this section of Hwy 85. The closest and only feasible parallel roadway is Eglin Boulevard through Eglin Main Base, which would be available only to those with permission to pass through the Eglin Main Base gates.

In the unlikely event of a permanent closure of Hwy 85, significant and likely untenable impacts on local and regional roadways would occur and would cause significant impacts on hurricane evacuation times. Crossing over (or under) Hwy 85 would not directly impact the capacity of this corridor, except during potential construction activities. However, if live munitions would be transported over or under Hwy 85, safety requirements could necessitate the temporary closure of this roadway during munitions-loading activities. These temporary closures could have a significant impact on regional travel, especially during the peak hours. As there are effectively no parallel roadways available to the general public, closure of Hwy 85 for any significant amount of time would create congestion and backlogs both to the north across the Eglin

Reservation and to the south along Hwy 85, potentially impacting access to the Air Combat Command gate, Main Gate, and the Northwest Florida Regional Airport. Given the lack of parallel roadway facilities or proximate alternative routes, closures of this section of Hwy 85 should be avoided if possible or limited to the maximum extent practicable if closure is not avoidable.

4.6.2 Alternative 2 – Duke Field

All subalternatives under Alternative 2 assume that the MOB would be at Duke Field, with traffic access occurring from Hwy 85 at the existing Duke Field entrance (McWhorter Way). The roadway traffic resulting from an alternative would be associated with personnel and hangar activities at the MOB, but not with F-35 flight activities at the auxiliary fields. All of Alternative 2's subalternatives assume that the MOB would be at Duke Field, and roadway traffic impacts would be the same under all subalternatives.

Approximately 300 personnel would travel from Eglin Main Base to Duke Field on a daily basis under this Alternative. As previously shown in Chapter 3 (Section 3.6.2, *Transportation: Region of Influence*), three roadway segments along the portion of Hwy 85 between Duke Field and the Main Gate are currently operating deficiently. Because Alternative 2 could directly impact these segments, the deficiency on Hwy 85 is of particular concern. Currently scheduled improvements will not completely address the existing deficiency; thus, mitigation measures could be necessary if Alternative 2 is shown to have a significant impact on the operations of Hwy 85.

Table 4-63 and Table 4-64 contain the results of the peak-hour, peak-direction roadway analysis for Alternative 2 for 2016 and 2021 projections, respectively. The analysis identified any roadway segment that operates deficiently, i.e., worse than the adopted local government level of service (LOS) standard.

Table 4-63. Alternative 2 in 2016 – Deficient Segments and Significant Impacts to Level of Service

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008				2016 Alternative 2 Duke Field						
					Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Significant[2]	% Significant	Significant& Adverse
Boatner Road															
Hatchee Rd to Hospital	2	0.23	E	507	500	E	0.99		550	F	1.08	Yes		0.0%	
Nomad Way															
Hwy 85 to Pumphouse	2	1.23	E	720	250	B	0.35		550	C	0.76		Yes	6.3%	

Table 4-63. Alternative 2 in 2016 – Deficient Segments and Significant Impacts to Level of Service, Cont'd

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008				2016 Alternative 2 Duke Field						
					Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Significant[2]	% Significant	Significant& Adverse
Hwy 10 (US 90)															
Hwy 85 to Antioch Road	4	0.65	D	1,600	1,300	D	0.81		1,900	F	1.19	Yes		1.6%	
Hwy 20															
Hwy 85 to Hwy 285 (N Partin Dr)	6	0.78	D	2,940	2,600	C	0.88		3,000	F	1.02	Yes		0.5%	
Hwy 285 (N Partin Dr) to Rocky Bayou Bridge	4	2.60	D	1,960	1,800	C	0.92		2,000	F	1.02	Yes		0.6%	
Rocky Bayou Bridge to Hwy 293 (White Point Rd)	4	2.10	D	1,960	1,700	C	0.87		2,100	F	1.07	Yes		0.5%	
Hwy 30 (US 98)															
Hwy 85 to Hwy 393 (Mary Esther Boulevard)	4	3.02	D	1,960	1,500	B	0.77		2,100	F	1.07	Yes		2.4%	
Hwy 393 (Mary Esther Boulevard) to Hurlburt Field Gate	4	2.70	D	1,960	2,300	F	1.17	Yes	2,400	F	1.22	Yes		0.0%	
Hwy 85															
Hwy 10 (US 90) to Hwy 8 (I-10)	4	2.17	D	1,600	1,900	F	1.19	Yes	2,700	F	1.69	Yes	Yes	12.0%	Yes
Hwy 8 (I-10) to PJ Adams Pkwy	4	0.95	C	1,210	2,200	F	1.82	Yes	3,300	F	2.73	Yes	Yes	25.5%	Yes
PJ Adams Rd to Duke Field	4	5.21	C	2,560	2,100	C	0.82		3,100	D	1.21	Yes	Yes	14.8%	Yes
Hwy 20 to Hwy 397 (John Sims Pkwy)	6	0.68	D	2,720	2,900	F	1.07	Yes	3,300	F	1.21	Yes		0.1%	
Hwy 123 to ACC Gate at Nomad Way+	4	1.05	D	1,960	2,400	F	1.22	Yes	2,600	F	1.33	Yes		3.0%	
ACC Gate at Nomad Way to Hwy 189 (Lewis Turner Blvd)	4	0.94	D	1,800	2,200	F	1.22	Yes	2,200	F	1.22	Yes		0.7%	
Hwy 189/Hwy 397 (Eglin Blvd) to 12th Avenue	4	1.36	None*	1,800	1,700	D	0.94	Yes	2,100	F	1.17	Yes		0.4%	
Hwy 123															
Hwy 85 to Hwy 85N	2	5.00	D	1,120	1,000	D	0.89		1,100	D	0.98		Yes	6.0%	
Hwy 188 (Racetrack Road)															
Hwy 189 (Beal Pkwy) to Hwy 85	4	2.60	D	1,960	1,700	C	0.87		2,100	F	1.07	Yes		0.4%	

Table 4-63. Alternative 2 in 2016 – Deficient Segments and Significant Impacts to Level of Service, Cont'd

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008				2016 Alternative 2 Duke Field						
					Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Significant[2]	% Significant	Significant& Adverse
Hwy 189															
General Bond Blvd to Mooney Rd	4	2.31	E	1,960	2,300	F	1.17	Yes	3,000	F	1.53	Yes		0.8%	
Mooney Rd to Hwy 188 (Racetrack Rd)	4	2.10	D	1,960	1,700	C	0.87		2,100	F	1.07	Yes	Yes	7.4%	Yes
Hwy 188 (Racetrack Rd) to Hwy 393 (Mary Esther Blvd)	4	1.50	D	1,770	2,200	F	1.24	Yes	2,400	F	1.36	Yes		0.3%	
Hwy 285															
Hwy 10 (US 90) to Okaloosa/Walton County Line	2	6.76	C	800	400	B	0.50		1,200	E	1.50	Yes	Yes	7.4%	Yes
Hwy 393 (Mary Esther Boulevard)															
Hwy 189 to Hwy 30 (US 98)	4	1.84	D	1,770	1,400	D	0.79		2,300	F	1.30	Yes		0.1%	

ACC = Air Combat Command; Blvd = boulevard; Dir = direction; Hr = hour; Hwy = Florida Highway; I-10 = Interstate 10; LOS = level of service; Pk = peak; Rd = Road; v/c = volume to capacity; Vol = volume

1. v/c ratio was calculated from daily adopted level of service standard
2. Significance is based on project trips for the alternative/action divided by the peak-hour, peak-direction capacity of the adopted level of service standard.

* Policy constrained in the Comprehensive Plan. Capacities are consistent with the Congestion Management System.

\+ Hwy 85 has been widened to six lanes from south of Hwy 123 to the airport entrance/exit. Updated count and capacity are based on four lanes where the updated count was provided.

Table 4-64. Alternative 2 in 2021 – Deficient Segments and Significant Impacts to Level of Service

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008				2021 Alternative 2 Duke Field						
					Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Significant[2]	% Significant	Significant& Adverse
Boatner Road															
Hatchee Rd to Hospital	2	0.23	E	507	500	E	0.99		550	F	1.08	Yes		0.1%	

Table 4-64. Alternative 2 in 2021 – Deficient Segments and Significant Impacts to Level of Service, Cont'd

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008				2021 Alternative 2 Duke Field						
					Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Significant[2]	% Significant	Significant& Adverse
Nomad Way															
Hwy 85 to Pumphouse	2	1.23	E	720	250	B	0.35		600	C	0.83		Yes	6.3%	
Pumphouse to Hwy 397 (Eglin Blvd/John Sims Pkwy)	2	0.85	E	720	250	B	0.35		850	F	1.18	Yes		0.0%	
Hwy 10 (US 90)															
Hwy 85 to Antioch Road	4	0.65	D	1,600	1,300	D	0.81		2,000	F	1.25	Yes		1.8%	
Hwy 20															
Hwy 85 to Hwy 285 (N Partin Dr)	6	0.78	D	2,940	2,600	C	0.88		3,000	F	1.02	Yes		0.5%	
Hwy 285 (N Partin Dr) to Rocky Bayou Bridge	4	2.60	D	1,960	1,800	C	0.92		2,000	F	1.02	Yes		0.6%	
Rocky Bayou Bridge to Hwy 293 (White Point Rd)	4	2.10	D	1,960	1,700	C	0.87		2,000	F	1.02	Yes		0.5%	
Hwy 30 (US 98)															
Hwy 85 to Hwy 393 (Mary Esther Boulevard)	4	3.02	D	1,960	1,500	B	0.77		2,300	F	1.17	Yes		2.5%	
Hwy 393 (Mary Esther Boulevard) to Hurlburt Field Gate	4	2.70	D	1,960	2,300	F	1.17	Yes	2,600	F	1.33	Yes		0.0%	
Hwy 85															
Hwy 10 (US 90) to Hwy 8 (I-10)	4	2.17	D	1,600	1,900	F	1.19	Yes	2,900	F	1.81	Yes	Yes	12.2%	Yes
Hwy 8 (I-10) to PJ Adams Pkwy	4	0.95	C	1,210	2,200	F	1.82	Yes	3,700	F	3.06	Yes	Yes	25.8%	Yes
PJ Adams Rd to Duke Field	4	5.21	C	2,560	2,100	C	0.82		3,200	D	1.25	Yes	Yes	15.0%	Yes
Hwy 20 to Hwy 397 (John Sims Pkwy)	6	0.68	D	2,720	2,900	F	1.07	Yes	3,300	F	1.21	Yes		0.1%	
Hwy 123 to ACC Gate at Nomad Way+	4	1.05	D	1,960	2,400	F	1.22	Yes	2,700	F	1.38	Yes		3.0%	
ACC Gate at Nomad Way to Hwy 189 (Lewis Turner Blvd)	4	0.94	D	1,800	2,200	F	1.22	Yes	2,400	F	1.33	Yes		0.8%	
Hwy 189/Hwy 397 (Eglin Blvd) to 12th Avenue	4	1.36	Note *	1,800	1,700	D	0.94	Yes	2,300	F	1.28	Yes		0.4%	
Hwy 188 (Racetrack Rd) to Hwy 30 (US 98)	6	2.96	Note *	2,940	2,100	B	0.71		3,100	F	1.05	Yes		0.2%	

Table 4-64. Alternative 2 in 2021 – Deficient Segments and Significant Impacts to Level of Service, Cont'd

Primary Roadway Segment	Number of Lanes 2016	Length (miles)	Adopted LOS	Capacity at LOS Standard	2008 Pk Hr Pk Dir Vol	2008 Pk Hr Pk Dir LOS	2008 v/c Ratio[1]	2008 Deficient?	2021 Alternative 2 Duke Field Pk Hr Pk Dir Vol	Pk Hr Pk Dir LOS	v/c Ratio[1]	Deficient?	Significant[2]	% Significant	Significant& Adverse
Hwy 123															
Hwy 85 to Hwy 85N	2	5.00	D	1,120	1,000	D	0.89		1,200	E	1.07	Yes	Yes	6.1%	Yes
Hwy 188 (Racetrack Road)															
Hwy 189 (Beal Pkwy) to Hwy 85	4	2.60	D	1,960	1,700	C	0.87		2,100	F	1.07	Yes		0.4%	
Hwy 189															
General Bond Blvd to Mooney Rd	4	2.31	E	1,960	2,300	F	1.17	Yes	3,200	F	1.63	Yes		0.8%	
Mooney Rd to Hwy 188 (Racetrack Rd)	4	2.10	D	1,960	1,700	C	0.87		2,100	F	1.07	Yes	Yes	7.6%	Yes
Hwy 188 (Racetrack Rd) to Hwy 393 (Mary Esther Blvd)	4	1.50	D	1,770	2,200	F	1.24	Yes	2,400	F	1.36	Yes		0.3%	
Hwy 285															
Hwy 10 (US 90) to Okaloosa/Walton County Line	2	6.76	C	800	400	B	0.50		950	D	1.19	Yes	Yes	7.6%	Yes
Hwy 393 (Mary Esther Boulevard)															
Hwy 189 to Hwy 30 (US 98)	4	1.84	D	1,770	1,400	D	0.79		2,500	F	1.41	Yes		0.1%	
Hwy 397 (Eglin Boulevard/John Sims Parkway)															
Museum Dr/Nomad Way to Hwy 189 (Lewis Turner Blvd)/West Gate	4	1.10	D	1,800	700	B	0.39		1,900	F	1.06	Yes		0.0%	

ACC = Air Combat Command; Blvd = Boulevard; Dir = direction; Hr = hour; Hwy = Florida Highway; I-10 = Interstate 10; LOS = level of service; Pk = peak; v/c = volume to capacity; Vol = volume

1. v/c ratio was calculated from daily adopted level of service standard
2. Significance is based on project trips for the alternative/action divided by the peak-hour, peak-direction capacity of the adopted level of service standard.

* Policy constrained in the Comprehensive Plan. Capacities are consistent with the Congestion Management System.

\+ Hwy 85 has been widened to six lanes from south of Hwy 123 to the airport entrance/exit. Updated count and capacity are based on four lanes where the updated count was provided.

According to the projection, 20 roadway segments would operate deficiently with respect to the adopted LOS standard for the peak-hour, peak-direction analysis in 2016, and 24 roadway segments would operate deficiently in 2021. Each of these deficient segments in 2016 were among the 21 roadway segments identified as being deficient in the No Action Alternative in 2016. Alternative 2 would result in one fewer deficient segment.

The analysis also identified which of the area roadways are projected to be significantly impacted by project-related trips and which of the significantly impacted roadways are projected to also be adversely impacted. The analysis identifies the same seven significantly impacted roadway segments for this Alternative in both 2016 and 2021. Five of the significantly impacted roadway segments are also projected to be adversely impacted in 2016, with six in 2021. These segments include portions of Hwy 85 that are directly adjacent to the proposed access point and provide the connection from the cantonment area/Duke Field to Interstate 10 and US 90. Section 4.6.3, *Summary of Improvements*, addresses improvements that could be needed to address the LOS deficiencies.

4.6.3 Summary of Improvements

As shown in Table 4-65 and Table 4-66, most of the deficient roadway segments identified as needing improvement in the analysis of the alternatives are also deficient in the No Action Alternative, indicating that the deficiency will exist even if none of the Proposed Action alternatives is implemented. In addition, the table indicates whether the deficiency exists today.

The improvements shown in the table are needed for the No Action Alternative and Alternatives 1 and 2. Some of the deficiencies, however, may not require the same type of improvement for each of the alternatives. Noted differences are reported for the following roadway segments:

- Nomad Way from the pumphouse to Eglin Boulevard does not require an improvement under Alternative 2 in 2016. The analysis does indicate, however, that widening would be needed by 2021.
- Eglin Boulevard from Nomad Way to Hwy 189 would be a candidate for Congestion Management System (CMS)/Transportation System Management (TSM) under Alternative 2 in 2021.

One deficient segment of Hwy 85, between Eglin Boulevard and 12th Avenue, is a constrained segment. This designation indicates that for either environmental or policy reasons, the local government has determined that it is not feasible to widen this roadway. Capacities for this constrained roadway are based on the Florida Department of Transportation (FDOT) 2009 Q/LOS Handbook Generalized Tables (FDOT, 2009). A more in-depth discussion about these tables is provided in Chapter 3 (Section 3.6.3, *Transportation: Analysis Methodology*). Any development of mitigations for this facility should consider CMS/TSM improvements to this corridor and should explore widening alternate corridors or creating new roadways. As this corridor traverses a largely built out and environmentally constrained area, the identification of new or alternate corridors is unlikely. Note that Hwy 85 is also constrained from 12th Avenue to US 98. This segment is included in the analysis, which did not indicate a need for improvement beyond CMS/TSM improvements on the section from Hwy 188/Racetrack Road to US 98 in 2021.

Table 4-65. 2016 – Deficiencies and Recommended Improvements

Roadway	From	To	Improvement	Def in 2008?	Def in No Action?	Def in Alt	Sig & Adv?
Boatner Road	*Hatchee Road*	*Hospital*	*Widen to 4 lanes*	*No*	*Yes*	*All*	
Nomad Way	*Pumphouse*	*Eglin Boulevard*	*Widen to 4 lanes***	*No*	*Yes*	*No Action, 1*	
Hwy 10 (US 90)	Hwy 85	Antioch Road	Widen to 6 lanes	No	Yes	All	
Hwy 20	Hwy 85N	Hwy 285	CMS/TSM	No	Yes	All	
Hwy 20	Hwy 285	Rocky Bayou Bridge	CMS/TSM	No	Yes	All	
Hwy 20	Rocky Bayou Bridge	White Point Road	CMS/TSM	No	Yes	All	
Hwy 30 (US 98)	Hwy 85 (Eglin Parkway)	Hwy 393 (Mary Esther Boulevard)	CMS/TSM	No	Yes	All	
Hwy 30 (US 98)	Hwy 393 (Mary Esther Boulevard)	Hurlburt Field Gate	Widen to 6 lanes	Yes	Yes	All	
Hwy 85	US 90	I-10	Widen to 6 lanes+	Yes	Yes	All	Yes (2)
Hwy 85	I-10	PJ Adams Parkway	Widen to 6 lanes+	Yes	Yes	All	Yes (2)
Hwy 85	PJ Adams Parkway	Duke Field	Widen to 6 lanes	No	Yes	All	Yes (2)
Hwy 85	Hwy 20	Hwy 397	Widen to 8 lanes+	Yes	Yes	All	
Hwy 85	Hwy 123	Nomad Way/ACC Gate	Widen to 6 lanes	Yes	Yes	All	
Hwy 85	ACC Gate at Nomad Way	Hwy 189 (Lewis Turner Boulevard)	Widen to 6 lanes	Yes	Yes	All	
Hwy 85	Eglin Boulevard	12th Avenue	Widen to 6 lanes*	No	Yes	All	
Hwy 123	Hwy 85	Hwy 85N	CMS/TSM***	No	No	1	
Hwy 188 (Racetrack Road)	Beal Parkway	Hwy 85	CMS/TSM	No	Yes	All	
Hwy 189	General Bond Boulevard	Mooney Road	Widen to 6 lanes+	Yes	Yes	All	
Hwy 189	Mooney Road	Racetrack Road	CMS/TSM	No	Yes	All	Yes (2)
Beal Parkway	Racetrack Road	Mary Esther Boulevard	Widen to six lanes	Yes	Yes	All	
Hwy 285	US 90	Okaloosa County Line	Widen to four lanes	No	Yes	All	Yes (2)

Table 4-65. 2016 – Deficiencies and Recommended Improvements, Cont'd

Roadway	From	To	Improvement	Def in 2008?	Def in No Action?	Def in Alt	Sig & Adv?
Mary Esther Boulevard	Hwy 189	US 98	Widen to six lanes	No	Yes	All	

ACC = Air Combat Command; Adv = adverse; Alt = Alternative; CMS = Congestion Management System; Hwy = Florida Highway; I-10 = Interstate 10; Sig = significant; TSM = Transportation System Management; US = U.S. Highway

Notes: CMS/TSM projects are suggested where the volume to capacity ratio is between 1.00 and 1.07.

Italics identify on-base roadways.

* Roadway is constrained and cannot be widened further.

** No improvement necessary under Alternative 2.

*** No improvement necessary under the No Action and Alternatives 2.

\+ Demand = the need for eight lanes. This may not be feasible or acceptable, in which case other options are available, including a corridor management plan, CMS/TSM improvements, projects on parallel corridors, etc., which should be explored first.

Table 4-66. 2021 – Deficiencies and Recommended Improvements

Roadway	From	To	Improvement	Def in 2008?	Def in No Action?	Def in Alt	Sig & Adv?
Boatner Road	*Hatchee Road*	*Hospital*	*Widen to 4 lanes*	*No*	*Yes*	*All*	
Nomad Way	*Pumphouse*	*Eglin Boulevard*	*Widen to 4 lanes*	*No*	*Yes*	*All*	
Hwy 10 (US 90)	Hwy 85	Antioch Road	Widen to 6 lanes	No	Yes	All	
Hwy 20	Hwy 85N	Hwy 285	CMS/TSM	No	Yes	All	
Hwy 20	Hwy 285	Rocky Bayou Bridge	CMS/TSM	No	Yes	All	
Hwy 20	Rocky Bayou Bridge	White Point Road	CMS/TSM	No	Yes	All	
Hwy 30 (US 98)	Hwy 85 (Eglin Parkway)	Hwy 393 (Mary Esther Boulevard)	Widen to 6 lanes	No	Yes	All	
Hwy 30 (US 98)	Hwy 393 (Mary Esther Boulevard)	Hurlburt Field Gate	Widen to 6 lanes	Yes	Yes	All	
Hwy 85	US 90	I-10	Widen to 6 lanes+	Yes	Yes	All	Yes (2)
Hwy 85	I-10	PJ Adams Parkway	Widen to 6 lanes+	Yes	Yes	All	Yes (2)
Hwy 85	PJ Adams Parkway	Duke Field	Widen to 6 lanes	No	Yes	All	Yes (2)
Hwy 85	Hwy 20	Hwy 397	Widen to 8 lanes+	Yes	Yes	All	
Hwy 85	Hwy 123	Nomad Way/ACC Gate	Widen to 6 lanes	Yes	Yes	All	
Hwy 85	ACC Gate at Nomad Way	Hwy 189 (Lewis Turner Boulevard)	Widen to 6 lanes	Yes	Yes	All	
Hwy 85	Eglin Boulevard	12th Avenue	Widen to 6 lanes*	Yes	Yes	All	
Hwy 85	Hwy 188 (Racetrack Road)	US 98	CMS/TSM	No	Yes	All	

Table 4-66. 2021 – Deficiencies and Recommended Improvements, Cont'd

Roadway	From	To	Improvement	Def in 2008?	Def in No Action?	Def in Alt	Sig & Adv?
Hwy 123	Hwy 85	Hwy 85N	CMS/TSM	No	Yes	All	Yes (2)
Hwy 188 (Racetrack Road)	Beal Parkway	Hwy 85	CMS/TSM	No	Yes	All	
Hwy 189	General Bond Boulevard	Mooney Road	Widen to 6 lanes+	Yes	Yes	All	
Hwy 189	Mooney Road	Racetrack Road	Widen to 6 lanes+	No	Yes	All	Yes (2)
Beal Parkway	Racetrack Road	Mary Esther Boulevard	Widen to 6 lanes	Yes	Yes	All	
Hwy 285	US 90	Okaloosa County Line	Widen to 4 lanes	No	Yes	All	Yes (2)
Hwy 285	Walton County Line	Swift Creek	CMS/TSM++	No	No	2-107	
Mary Esther Boulevard	Hwy 189	US 98	Widen to 6 lanes	No	Yes	All	
Eglin Boulevard	Nomad Way	Hwy 189	Widen to 6 lanes+	No	Yes	All	

ACC = Air Combat Command; Adv = adverse; Alt = Alternative; CMS = Congestion Management System; Hwy = Florida Highway; I-10 = Interstate 10; Sig = significant; TSM = Transportation System Management; US = U.S. Highway

Notes: CMS/TSM projects are suggested where the volume to capacity ratio is between 1.00 and 1.07.

Italics identify on-base roadways.

* Roadway is constrained and cannot be widened further.

\+ CMS might be more appropriate for Alternative 2

++ No improvements necessary for the No Action and Alternative 2

As indicated in Table 4-65 and Table 4-66, the demand on several roadways exceeds the capacity of a six-lane roadway. However, an improvement beyond six lanes may not be feasible for many reasons, including right-of-way availability, safety concerns, cost, etc. Other improvements that should be considered include CMS and TSM projects, a corridor management plan that looks at access along the corridor, and transit improvements. These types of improvements are potential options to preserve capacity in the corridor. In addition, the study of potential alternate corridors or improvements to parallel corridors is recommended.

The analysis segments that fall into one of the two scenarios described above include the following:

- Hwy 85 from US 90 to PJ Adams Parkway (also deficient today)
- Hwy 85 from Hwy 20 to Hwy 397 (also deficient today)

- Hwy 85 from Eglin Boulevard to 12th Avenue (also deficient today)
- Hwy 189 from General Bond Boulevard to Mooney Road (also deficient today)

The Florida *Transportation Uniform Standard Code*, 9J-2.045, Florida Administrative Code (FAC), gives the Florida Department of Community Affairs (DCA) guidance on how to evaluate transportation facility issues in the review of applications for local government development orders and Developments of Regional Impacts (DRIs). According to 9J-2.045(6) FAC, a state and regionally significant roadway segment shall be determined by the DCA to be significantly impacted by the proposed development if, at a minimum, traffic projected to be generated at the end of any stage or phase of the proposed development, cumulatively with previous stages or phases, will utilize 5 percent or more of the adopted peak-hour, peak-direction LOS maximum service volume of the roadway. Additionally, if a significantly impacted roadway is projected to be operating below the adopted LOS standard at build-out of that stage or phase, then the impact is considered to be significant and adverse.

Although no development or construction to the regional roadway network is expected to occur as a result of the Base Realignment and Closure (BRAC) actions, increased traffic in association with each alternative is anticipated. Therefore, the traffic analysis in this SEIS has adopted the 5 percent threshold for DRIs as a measure of significant impacts on roadways.

The analysis evaluated future traffic volumes to determine potential impacts on existing roadways, as well as potential impacts on the traveling public. Future traffic volumes were estimated by including current roadway traffic, traffic related to BRAC actions, and anticipated future traffic growth not associated with BRAC actions. Generally, if a roadway's LOS is anticipated to be deficient in the future and the traffic generated by BRAC is significant, then the traffic generated by the alternative could be considered to have a major impact on the resource, as the future condition of the roadway could be made worse due to traffic growth associated with BRAC. Conversely, if the anticipated traffic associated with the BRAC alternative is not significant on the deficient roadway, then the BRAC alternative could be considered to not have a significant impact on the resource.

Roadway segments with significant and adverse impacts included the following:

- Hwy 85 from US 90 to Duke Field under Alternative 2 (2016 and 2021)
- Hwy 123 from Hwy 85N to Hwy 85 under Alternative 2 (2021)
- Hwy 189/Lewis Turner Boulevard from Mooney Road to Racetrack Road under Alternative 2 (2016 and 2021)
- Hwy 285 from US 90 to the Okaloosa County line under Alternative 2 (2016 and 2021)

4.6.4 Mitigations

The demand on several roadways equates to the need for six lanes or more. However, an improvement for six lanes or more may not be feasible for many reasons, including right-of-way availability, safety concerns, cost, etc. Other improvements that should be considered include CSM/TSM projects, a corridor management plan that looks at access along the corridor, and transit improvements.

4.7 UTILITIES

The following discussion focuses on the current utilities on Eglin Main Base and Duke Field that would be used to support the Proposed Action, and analyzes their suitability and efficiency.

4.7.1 Alternative 1 – Eglin Main Base

As the number of personnel and facilities required under Alternatives 1A and 1I would be similar, impacts on utilities would also be the same and are discussed below. The existing conditions (i.e., the No Action Alternative) and permitting regulations on Eglin Main Base are discussed in Chapter 3 (Section 3.7, *Utilities*).

Utility usage and impacts under Alternatives 1A and 1I are the same as those discussed under the No Action Alternative. Potable water usage would remain within permitted limits, and wastewater would remain within the current permitted capacity. Additionally, no adverse impacts on the electricity or natural gas supply in northwest Florida would occur.

4.7.2 Alternative 2 – Duke Field

As the number of personnel and facilities required under Alternatives 2A, 2B, and 2C, 2D and 2E would be similar, impacts on utilities would also be similar.

Potable Water

Under Alternative 2, both the Housing Area water system at Eglin Main Base and the Duke Field water system would be used to support the JSF. The existing conditions (i.e., the No Action Alternative) and permitting regulations on Eglin Main Base are discussed in Chapter 3, Section 3.7. Duke Field has one water system with four wells (Figure 4-68), three of which draw water from the Floridan Aquifer and provide potable water for all of Duke Field. The remaining well draws water from the Sand and Gravel Aquifer for irrigation purposes.

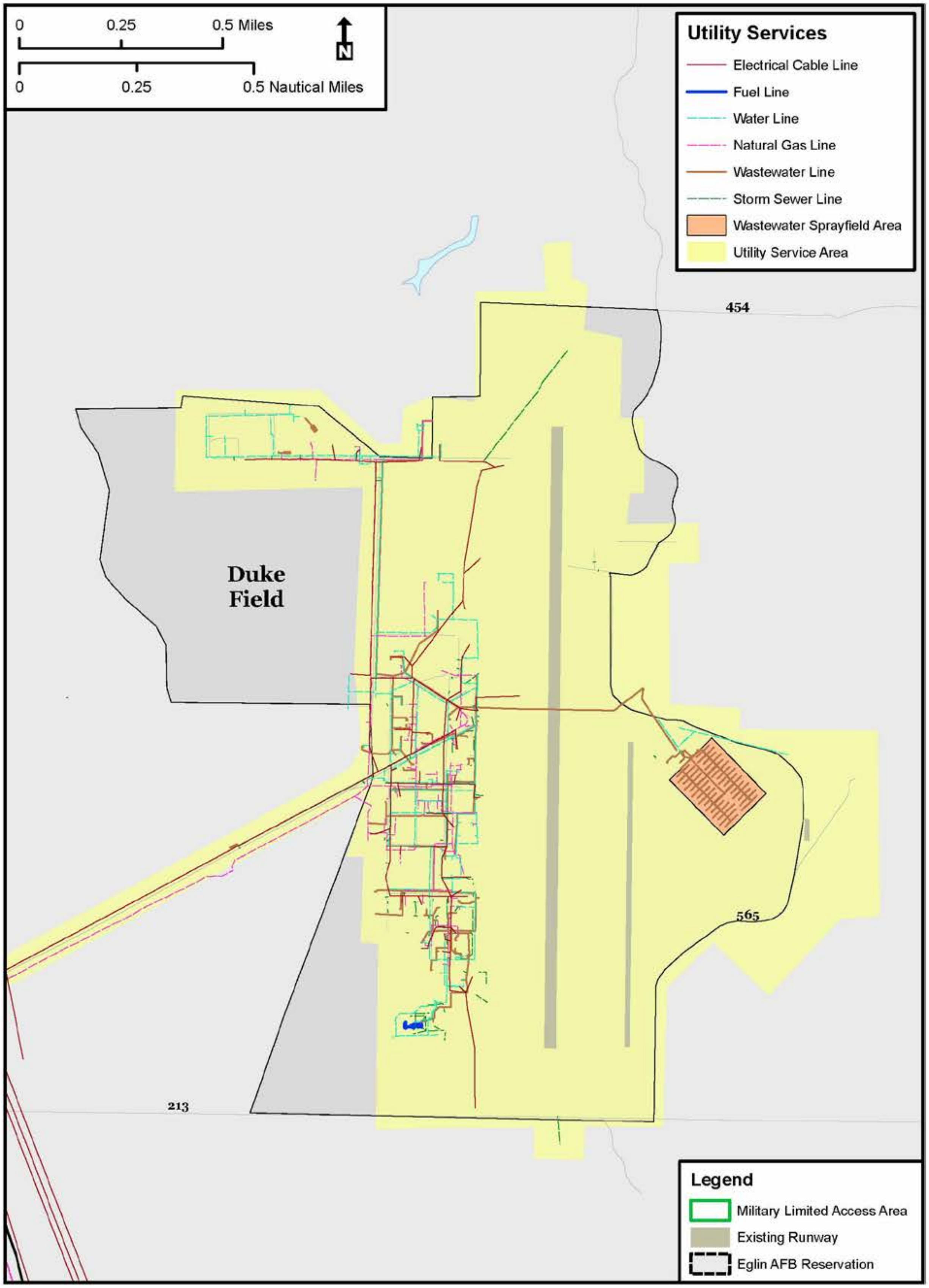


Figure 4-68. Duke Field Utilities

The amount of potable water currently drawn from the Floridan Aquifer is less than the levels permitted by the Consumptive Use Permit authorization for Duke Field (Table 4-67). As demand increases with the influx of additional people and military missions to Eglin AFB, future considerations for the potable water supply may require developing additional water systems and Consumptive Use Permits, making changes to reduce water consumption, and identifying aquifer-dependent areas (Brown, 2006a).

Table 4-67. Permitted and Actual Potable Water Use on Duke Field

Water Supply System	Permitted Average Daily Limit (gal/day)	Permitted Maximum Daily Limit (gal/day)	Permitted Maximum Monthly Limit (gal/month)	2011 Average Daily Rate (gal/day)	2011 Average Monthly Rate (gal/month)
Duke Field	380,000	1.0 million	23.2 million	50,145	1.53 million

Source: Adams, 2012
gal/day = gallons per day; gal/month = gallons per month

Under Alternative 2, the JSF would potentially use approximately 278,000 gallons of water per day, or 101.4 million gallons per year, at Eglin Main Base and approximately 295,000 gallons of water per day, or 107.7 million gallons per year, at Duke Field. There would be no change in the amount of total potable water used from the No Action Alternative. The total average daily rates would be 1.034 million gallons per day (mgd) at Eglin Main Base and 0.145 mgd at Duke Field, both of which would remain within the respective water system-permitted limits (Table 4-68). Therefore, no adverse impacts on potable water would occur under Alternative 2.

Table 4-68. Alternative 2: Potable Water Usage

Water System	2011 Average Daily Rate (mgd)	JSF Estimated Average Daily Rate (mgd)	Total Average Daily Rate (mgd)*	Permitted Average Daily Limit (mgd)	Permitted Maximum Daily Limit (mgd)
Eglin Main Base Housing Area	0.756	0.278	1.034	1.92	4.99
Duke Field	0.050	0.295	0.145	0.38	1.0

mgd = million gallons per day
**Total Average Daily Rate = 2011 average daily rate + JSF program estimated average daily rate.

Potable water estimates and impacts are based on personnel numbers. However, the freshwater aircraft rinses and aircraft wash rack located at Duke Field would also draw water from the Floridan Aquifer. This type of water use is classified as Industrial water use.

Approximately 780,000 additional gallons per year, an average of 2,100 gallons per day, would be used for aircraft washing and rinsing. This increase in water use for F-35 aircraft washing and rinsing would account for less than a 1 percent increase in the total average daily rate of Industrial water use.

Even though the proposed JSF aircraft wash rack and rinses would continue to utilize the Floridan Aquifer, there would be no significant impact on potable water, because this type of industrial water use accounts for such a small percentage of the overall potable water use of the Floridan Aquifer by Duke Field.

Wastewater

Wastewater treatment plants (WWTPs) at both Eglin Main Base and Duke Field would be used under Alternative 2. The existing conditions (i.e., the No Action Alternative) and permitting regulations for the Plew Heights and Eglin Main Base WWTPs on Eglin Main Base are discussed in Chapter 3, Section 3.7.

Duke Field has its own WWTP (Figure 4-68) that maintains adequate supplies and is capable of meeting an increased demand. As detailed in Table 4-69, Duke Field has a high growth potential.

Table 4-69. Duke Wastewater Treatment Plant Capacities

WWTP Location	Permitted Capacity (mgd)*	Annual Average (mgd)*	Percentage of Capacity Used*	Areas Served by WWTP
Duke Field Treatment Facility	0.125	0.008	6.4	Duke Field

*Data as of November 2011
Sources: Brown, 2012; mgd = million gallons per day; WWTP = wastewater treatment plant

Under Alternative 2, the JSF is estimated to produce a total of 93,435 gallons of wastewater per day or 34.1 million gallons per year. Approximately 63,500 and 30,000 gallons of wastewater per day would be produced at Eglin Main Base and Duke Field, respectively (Table 4-70).

Although the rinse water resulting from the two freshwater aircraft rinses would be allowed to be absorbed directly into the ground without first being processed by a WWTP, an estimate for the rinses is included to account for the potential of some water ending up in the wastewater stream. As such, the wastewater calculation assumes that all the rinse water enters the wastewater stream, thereby providing a conservative estimate.

The total amount of wastewater produced per day would increase by approximately 2.4 percent over the No Action Alternative.

The current wastewater input to the Plew Heights and Eglin Main Base WWTPs consumes less than 20 and 35 percent of the total permitted capacity, respectively. With the conservative estimate that all additional wastewater from the JSF at Eglin Main (63,588 gallons per day) would be treated at either the Plew Heights WWTP or the Eglin Main Base WWTP, the annual averages would increase to either 0.322 mgd at the Plew

Heights WWTP or 0.393 mgd at the Eglin Main Base WWTP (Table 4-71). This would result in approximately 22 and 39 percent of the total permitted capacity being utilized at the Plew Heights and Eglin Main Base WWTPs, respectively. Neither WWTP would have difficulty accommodating the additional flow from the JSF on its own, and impacts would be further reduced if both WWTPs were used. Therefore, there would not be any adverse impacts with the implementation of any Alternative 2 subalternative.

Table 4-70. Alternative 2: Estimated Wastewater Flows at Eglin Main and Duke Field

Generalized Activity	Number of People	Wastewater Produced per Person (gal/day)	Total Wastewater Produced (gal/day)
Eglin Main			
Working (office & industrial)	1,203	13	15,639
Living (dormitory)	732	40	29,280
3 meals/day (dining hall)	732	21	15,372
1 meal/day (dining hall)	471	7	3,297
		Eglin Total	**63,588**
Duke Field			
Working (office & industrial)	1,278	13	16,614
Living (dormitory)	0	40	0
3 meals/day (dining hall)	0	21	0
1 meal/day (dining hall)	1,587	7	11,109
Aircraft Washing and Rinsing		36 (per aircraft)	2,124
		Duke Total	**29,847**
		Grand Total	**93,435**

gal/day = gallons per day

At the Duke Field WWTP, only 6.4 percent of the total permitted capacity is currently being used. The additional wastewater from the JSF (29,847 gallons per day) would increase the average annual wastewater input to approximately 0.038 mgd (Table 4-71). This would result in 30 percent of the total permitted capacity being used. Although the addition of the JSF at Duke Field would greatly increase the amount of wastewater at the Duke Field WWTP, levels would remain within the permitted capacity. Therefore, no adverse impacts under Alternative 2 are expected.

Table 4-71. Alternative 2: Wastewater Treatment Plant Capacity

WWTP Location	Current Annual Average (mgd)	Annual Average Including JSF (mgd)	Permitted Capacity (mgd)	Percentage of Capacity Used
Plew Heights	0.258	0.322	1.5	22
Eglin Main	0.329	0.393	1.0	39
Duke Field	0.008	0.038	0.125	30

JSF = Joint Strike Fighter; mgd = million gallons per day; WWTP = wastewater treatment plant

Electricity and Natural Gas

Based on the amount of new square footage to be constructed for JSF facilities under Alternative 2, it is estimated that the total JSF electrical requirement would be approximately 20,794,000 kilowatt hours (kWh) per year or 56,970 kWh per day (Table 4-72). Based on fiscal year (FY) 2011 usage, the estimated electrical requirement to support all JSF facilities would be a 9.0 percent increase over the total usage in 2011.

The estimated natural gas requirement for JSF would be approximately 29,755 million cubic feet (MCF) per year (82 MCF per day). Based on FY 2011 usage, the estimated natural gas requirement to support all JSF facilities would be a 7.2 percent increase over the total usage in 2011 (Table 4-72). The increased consumption of natural gas is well within the current theoretical capacity of the gas pipeline serving Eglin Main Base (68,000 MCF per day, or 24,820,000 MCF per year).

Table 4-72. Alternative 2: Electric and Natural Gas Annual Consumption

Source	Eglin AFB Total Consumption 2011	Estimated Annual JSF Consumption	Total	Percent Increase
Electricity (kWh)	232,001,258	20,794,000	**252,795,258**	9.0
Natural gas (MCF)	413,891	29,755	**443,646**	7.2

AFB = Air Force Base; kWh = kilowatt hours; JSF = Joint Strike Fighter; MCF = million cubic feet

Alternative 2 would result in an 80 percent increase in electricity and natural gas usage over the No Action Alternative.

Additional electrical infrastructure may need to be added or existing infrastructure slightly modified to accommodate certain aspects of the JSF. Although natural gas infrastructure already exists on Eglin Main Base and Duke Field, new infrastructure may be needed to support new construction. However, based on the existing capacity of the main lines serving Eglin Main Base and Duke Field, installing additional pipes is not expected to adversely affect the natural gas supply system.

Supporting the JSF under Alternative 2 would not adversely affect the electricity or natural gas supply in northwest Florida.

4.7.3 Mitigations

There would be no significant or adverse impacts to existing utilities; therefore, mitigations are not necessary. No specific measures have been identified as necessary to mitigate impacts to utilities at this time. However, should appropriate mitigations be identified through the adaptive management process, the Air Force may choose to implement them at that time.

4.8 AIR QUALITY

Identifying the affected area for an air quality assessment requires knowledge of sources of air emissions, pollutant types, emission rates and release parameters, proximity to other emissions sources, and local conditions. Refer to Appendix D, *Air Quality*, and Chapter 3, Section 3.8, *Air Quality*, for a review of air quality and the associated methodologies used for emissions calculations.

4.8.1 Commonalities Across All Alternatives

Munitions Use

Under Alternative 1A, munitions use would increase slightly over munitions use associated with the No Action Alternative (Chapter 3, Section 3.8.5); however, the overall impact on air quality in the ROI would be extremely minimal (Table 4-73).

Table 4-73. Alternative 1A (Preferred Alternative) – Munitions Emissions

Source	Calculated Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
GBU-12 Live	0.01	1.52	3.63	0	0.03	0
ROI Emissions	**--**	**360,547**	**64,223**	**35,277**	**57,376**	**178,067**
Percentage of ROI Emissions	--	0.00%	0.01%	0.00%	0.00%	0.00%

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; GBU = guided bomb unit; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Tyndall AFB

As stated in the *F-22 EA*, the construction and operation emissions have the greatest impacts to nitrogen oxides (NO_x), which would be approximately 9 percent of Bay County emissions. Aircraft emissions make up the majority of these emissions. No significant impact to regional air quality is expected.

4.8.2 Alternative 1 – Eglin Main Base

4.8.2.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Construction and Personnel Emissions

Under Alternative 1A, the construction and personnel requirements would be the same as for the No Action Alternative (Chapter 3, Section 3.8.5).

Flight Operations Emissions

The impacts on air quality from flight operations (including aircraft emissions, auxiliary ground equipment [AGE], and airspace usage) under Alternative 1A would be the same as those discussed for the No Action Alternative (Chapter 3, Section 3.8.5).

Summary

Table 4-74 shows the annual emissions from all sources under Alternative 1A and a comparison to the baseline emissions under the No Action Alternative. Under Alternative 1A, emissions would decrease from the No Action Alternative baseline. Total emissions under Alternative 1A would be minimal in relation to the ROI baseline emissions; the highest percentage is 1.13 percent for PM_{10}. Therefore, there would be no air quality impacts from implementation of Alternative 1A.

Table 4-74. Summary of Alternative 1A (Preferred Alternative) – Air Emissions

Emission Activities	Emissions (tons per year)					
	CO_2-e	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOCs**
Construction and Personnel Emissions	19,676.78	135.03	28.02	447.21	27.2	10.33
Total Aircraft and Ground Support Emissions	119,651.31	422.31	467.75	15.75	35.54	39.11
Total Munitions Emissions	**0.01**	**1.52**	**3.63**	**0**	**0.03**	**0**
Total Emissions	**139,328.10**	**558.86**	**499.40**	**462.96**	**62.77**	**49.44**
Net change from No Action Alternative	**-0.57**	**-13.31**	**31.66**	**-0.10**	**-0.41**	**0.00**
ROI Emissions	*360,547*	*64,223*	*35,277*	*57,376*	*178,067*	
Percent of ROI Emissions	*0.16%*	*0.78%*	*1.31%*	*0.11%*	*0.03%*	

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; SO_2 = sulfur dioxide; VOC = volatile organic compound

4.8.2.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Construction and Personnel Emissions

Under Alternative 1I, an expansion runway would be constructed in addition to the facilities approved in the February 2009 ROD.

Table 4-75 shows criteria pollutant emissions from construction activities. Table 4-76 presents emissions from construction and incoming personnel compared with the ROI.

Table 4-75. Estimated Construction Air Emissions Under Alternative 1I

Source Category		Emissions (tons per year)					
		CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Maximum Annual Construction Project Emissions	Acres Paved	0	0	0	0	0	0
	Demolition	0	0	0	1.04	0	0
	Grading Equipment	0	2.76	10.4	1.56	1.06	1.11
	Grading Operations	0	0	0	556.37	0	0
	Mobile Equipment	1,956.86	7.12	16.97	0.27	2.1	1.55
	Nonresidential Architectural Coatings	0	0	0	0	0	0.2
	Stationary Equipment	838.66	48.27	1.25	0.01	0.06	1.81
	Workers Trips	103.76	65.03	3.23	0.11	0	2.98
	Total	**2,899.28**	**123.18**	**31.85**	**559.36**	**3.22**	**7.65**

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; SO_2 = sulfur dioxide; VOC = volatile organic compound

Table 4-76. Percentage of Construction and Additional Personnel Emissions Associated With Alternative 1I Compared With the Region of Influence

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Construction Emissions	2,899.28	123.18	31.85	559.36	3.22	7.65
Point Source	9,008.19	6.5	3.21	1.18	24.28	3.44
Mobile Source	7,008.25	8.11	3.36	0.25	0.76	0.35
Total	**18,915.72**	**137.79**	**38.42**	**560.79**	**28.26**	**11.44**
ROI Emissions	**--**	360,547	64,223	35,277	57,376	178,067
Percentage of ROI Emissions	--	*0.04%*	*0.06%*	*1.59%*	*0.05%*	*0.01%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides;
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns;
SO_2 = sulfur dioxide; VOC = volatile organic compound

Flight Operations

Flight operations under Alternative 1I would be distributed over the established runway and the new runway without change to the number of operations occurring at Eglin Main. Therefore, flight operations for Alternative 1I would be the same as those discussed for the No Action Alternative. Table 3-27 and Table 3-29 summarize aircraft emissions from operations at Eglin Main Base and all associated auxiliary fields, including AGE compared with National Emissions Inventory emissions for the ROI.

Summary

Table 4-77 shows the annual emissions from all sources under Alternative 1I and a comparison to the baseline emissions under the No Action Alternative. Under Alternative 1I, PM_{10}, sulfur dioxide (SO_2), and volatile organic compound (VOC) emissions would increase over the No Action Alternative baseline. The largest increase would be in PM_{10}, predominantly caused by temporary construction activities, which would increase PM_{10} emissions by approximately 113.48 tons per year (tpy). However, total emissions under Alternative 1I would still be minimal in relation to the ROI baseline emissions; the highest percentage is 1.63 percent for PM_{10}. Therefore, there would be no air quality impacts from implementation of Alternative 1I.

Table 4-77. Summary of Alternative 1I Air Emissions

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Construction and Personnel Emissions	18,915.72	137.79	38.42	560.79	28.26	11.44
Total Aircraft and Ground Support Emissions	121,761.22	430.66	474.83	15.82	36.18	39.30
Total Munitions Emissions	0.01	1.52	3.63	0	0.03	0
Total Emissions	**140,676.95**	**569.97**	**516.8848**	**576.6097**	**64.47097**	**50.73943**
Net change from No Action Alternative	-761.63	-10.55	-21.26	113.48	0.65	1.11
ROI Emissions	--	*360,547*	*64,223*	*35,277*	*57,376*	*178,067*
Percent of ROI Emissions	--	*0.16%*	*0.80%*	*1.63%*	*0.11%*	*0.03%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

4.8.3 Alternative 2 – Duke Field

4.8.3.1 *Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field*

Construction and Personnel Emissions

Table 4-78 presents the emissions associated with construction activities under Alternative 2A. Table 4-79 compares emissions from construction and incoming JSF personnel with the ROI emissions.

Table 4-78. Estimated Construction Air Emissions Under Alternative 2A

Source Category		Emissions (tons per year)					
		CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Maximum Annual Construction Project Emissions	Acres Paved	0	0	0	0	0	0.02
	Demolition	0	0	0	0	0	0
	Grading Equipment	0	0	0	0.85	0	0
	Grading Operations	0	0	0	305.02	0	0
	Mobile Equipment	2,236.42	7.12	16.97	0.27	2.1	1.55
	Nonresidential Architectural Coatings	0	0	0	0	0	0.37
	Stationary Equipment	908.54	48.27	1.25	0.01	0.06	1.81
	Workers Trips	114.14	122.25	6.07	0.21	0	5.6
	Total	**3,259.10**	**177.64**	**24.29**	**306.36**	**2.16**	**9.35**

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; SO_2 = sulfur dioxide; VOC = volatile organic compound

Table 4-79. Percentage of Construction and Additional Personnel Emissions Associated With Alternative 2A Compared With the Region of Influence

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Construction Emissions	**3,259.10**	177.64	24.29	306.36	2.16	9.35
Point Source	10,939.34	6.5	3.21	1.18	24.28	3.44
Mobile Source	7,008.25	8.11	3.36	0.25	0.76	0.35
Total	**21,206.69**	**192.25**	**30.86**	**307.79**	**27.2**	**13.14**
ROI Emissions	--	360,547	64,223	35,277	57,376	178,067
Percentage of ROI Emissions	--	*0.05%*	*0.05%*	*0.87%*	*0.05%*	*0.01%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with a diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Flight Operations

Table 4-80 displays air emissions for JSF aircraft under Alternative 2A. Emissions are shown for a Duke Field MOB and for auxiliary fields that would be used (Choctaw Field). Table 4-81 compares air emissions associated with construction activities and incoming JSF personnel under Alternative 2A with the ROI's baseline emissions.

Table 4-80. Aircraft Emissions by F-35 Configuration – Alternative 2A

Alternative 2A		Emissions/Aircraft (tons per year)						Total Emissions (tons per year)					
Aircraft Type	Qty	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC
Duke Main Operating Base - Red Air Aircraft Emissions													
Red Air CTOL F-16	4	1	9.97	8.09	1.12	0.56	2.82	8,029.48	39.88	32.36	4.48	2.24	11
Red Air F-18 for CV JSF	4	222.23	4.72	0.45	0.54	0.06	1.82	888.92	18.88	1.8	2.16	0.24	7.3
Red Air F-18 for STOVL JSF	4	335.79	7.01	0.66	0.81	0.09	2.7	1,343.18	28.04	2.64	3.24	0.36	11
Total Red Air Aircraft Emissions								**10,261.58**	**86.8**	**36.8**	**9.88**	**2.84**	**29**
Duke Main Operating Base - Training Aircraft													
CTOL Training JSF	24	1161.73	2.88	3.227	0.031	0.36	0.07	27,881.49	69.13	77.44	0.75	8.54	1.67
CV Training JSF	15	1017.45	3.356	3.339	0.067	0.31	0.07	15,261.77	50.35	50.08	1.00	4.62	1.01
STOVL Training JSF	20	2697.83	3.498	9.913	0.057	0.8	0.09	53,956.68	69.97	198.25	1.13	15.98	1.81
Total Training Aircraft Emissions								**97,099.93**	**189.4**	**325.8**	**2.88**	**29.1**	**4.5**
Auxiliary Fields - Training Aircraft													
CTOL Training JSF	24	255.645	0.335	0.954	0.007	0.08	0.01	6,135.48	8.04	22.89	0.17	1.88	0.19
CV Training JSF	15	1355.02	1.209	6.473	0.043	0.41	0.02	20,325.31	18.14	97.09	0.64	6.15	0.34
STOVL Training JSF	20	307.869	0.687	1.113	0.007	0.09	0.02	6,157.37	13.74	22.26	0.15	1.83	0.31
Total Training Aircraft Emissions								**32,618.17**	**39.92**	**142.2**	**0.96**	**9.85**	**0.8**

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; CTOL = conventional take-off and landing; CV = carrier variant; JSF = Joint Strike Fighter; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; Qty = quantity; SO_2 = sulfur dioxide; STOVL = short take-off vertical landing; VOC = volatile organic compound

Table 4-81. Aircraft Emissions Associated With Alternative 2A Compared With the Region of Influence

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Red Air	10,261.58	86.8	36.8	9.88	2.84	29.36
Duke Main Operating Base	97,099.93	189.44	325.78	2.88	29.14	4.49
Outlying Field	32,618.17	39.92	142.24	0.96	9.85	0.85
AGE	1,797.53	133.15	37.67	2.85	2.74	0.49
Total	**141,777.21**	**449.32**	**542.4887**	**16.56701**	**44.57375**	**35.18345**
ROI Emissions	--	360,547	64,223	35,277	57,376	178,067
Percentage of ROI Emissions	--	*0.12%*	*0.84%*	*0.05%*	*0.08%*	*0.02%*

AGE = auxiliary ground equipment; CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Summary

Table 4-82 shows the annual emissions from all sources under Alternative 2A and a comparison to the baseline emissions under the No Action Alternative. Under Alternative 2A, emissions would increase over the No Action Alternative baseline. The largest increase would be in carbon monoxide (CO), which would increase by approximately 62.57 tpy. However, total emissions under Alternative 2A would still be minimal in relation to the ROI baseline emissions; the highest percentage is 0.92 percent for PM_{10}. Therefore, there would be no air quality impacts from implementation of Alternative 2A.

Table 4-82. Summary of Alternative 2A Air Emissions

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Construction and Personnel Emissions	21,206.69	192.25	30.86	307.79	27.2	13.14
Total Aircraft and Ground Support Emissions	141,777.21	449.32	542.49	16.57	44.57	35.18
Total Munitions Emissions	0.01	1.52	3.63	0	0.03	0
Total Emissions	**162,983.91**	**643.09**	**576.9787**	**324.357**	**71.80375**	**48.32345**
Net change from No Action Alternative	**21,545.33**	**62.57**	**38.83**	**-138.77**	**7.98**	**-1.31**
ROI Emissions	--	*360,547*	*64,223*	*35,277*	*57,376*	*178,067*
Percent of ROI Emissions	--	*0.18%*	*0.90%*	*0.92%*	*0.13%*	*0.03%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

4.8.3.2 *Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12*

Construction and Personnel Emissions

Under Alternative 2B, air emissions impacts due to construction would be the same as those discussed previously for Alternative 2A. There would be no significant impacts on air quality as a result of implementing Alternative 2B.

Flight Operations

Table 4-83 displays air emissions for JSF aircraft under Alternative 2B. Emissions are shown for a Duke Field MOB and for auxiliary fields that would be used (Eglin Main Base). Table 4-84 compares the air emissions associated with construction activities and incoming JSF personnel under Alternative 2B with the ROI's baseline emissions.

Table 4-83. Aircraft Emissions by F-35 Configuration – Alternative 2B

Alternative 2B		Emissions/Aircraft (tons per year)						Total Emissions (tons per year)					
Aircraft Type	Qty	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC
Duke Main Operating Base - Red Aircraft Emissions													
Red Air CTOL F-16	4	1	9.97	8.09	1.12	0.56	2.82	8,029.48	39.88	32.36	4.48	2.24	11
Red Air F-18 for CV JSF	4	222.23	4.72	0.45	0.54	0.06	1.82	888.92	18.88	1.8	2.16	0.24	7.3
Red Air F-18 for STOVL JSF	4	335.79	7.01	0.66	0.81	0.09	2.7	1,343.18	28.04	2.64	3.24	0.36	11
Total Red Air Aircraft Emissions								**10,261.58**	**86.8**	**36.8**	**9.88**	**2.84**	**29.4**
Duke Main Operating Base - Training Aircraft													
CTOL Training JSF	24	1045.96	2.754	2.926	0.028	0.32	0.07	25,102.94	66.10	70.23	0.68	7.69	1.58
CV Training JSF	15	2115.13	3.557	9.044	0.089	0.64	0.07	31,726.92	53.35	135.66	1.34	9.60	1.05
STOVL Training JSF	20	2541.2	3.36	9.098	0.053	0.74	0.09	50,824.08	67.19	181.96	1.06	14.89	1.75
Total Training Aircraft Emissions								**107,653.94**	**186.6**	**387.8**	**3.07**	**32.18**	**4.38**
Auxiliary Fields - Training Aircraft													
CTOL Training JSF	24	327.328	0.536	1.1	0.009	0.1	0.01	7,855.88	12.86	26.41	0.21	2.41	0.3
CV Training JSF	15	203.173	0.407	0.864	0.01	0.06	0.01	3,047.59	6.104	12.96	0.16	0.92	0.1
STOVL Training JSF	20	585.025	1.261	1.963	0.014	0.18	0.03	11,700.50	25.22	39.26	0.28	3.55	0.6
Total Training Aircraft Emissions								**22,603.97**	**44.19**	**78.64**	**0.65**	**6.88**	**1.05**

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; CTOL = conventional take-off and landing; CV = carrier variant; JSF = Joint Strike Fighter; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; Qty = quantity; SO_2 = sulfur dioxide; STOVL = short take-off vertical landing; VOC = volatile organic compound

Table 4-84. Aircraft Emissions Associated With Alternative 2B Compared With the Region of Influence

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_X	PM_{10}	SO_2	VOC
Red Air	10,261.58	86.8	36.8	9.88	2.84	29.36
Duke Main Operating Base	107,653.94	186.65	387.85	3.07	32.18	4.38
Outlying Field	22,603.97	44.19	78.64	0.65	6.88	1.05
AGE	1,846.86	136.81	38.71	2.93	2.81	0.50
Total	**142,366.34**	**454.44**	**541.99**	**16.53**	**44.71**	**35.29**
ROI Emissions	--	360,547	64,223	35,277	57,376	178,067
Percentage of ROI Emissions	--	*0.13%*	*0.84%*	*0.05%*	*0.08%*	*0.02%*

AGE = auxiliary ground equipment; CO = carbon monoxide; CO2-e = carbon dioxide equivalent; NOx = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Summary

Table 4-85 shows the annual emissions from all sources under Alternative 2B and a comparison to the baseline emissions under the No Action Alternative. Under Alternative 2B, emissions would increase over the No Action Alternative baseline. The largest increase would be in CO, which would increase by approximately 67.67 tpy. However, total emissions under Alternative 2B would still be minimal in relation to the ROI baseline emissions; the highest percentage is 0.92 percent for PM_{10}. Therefore, there would be no air quality impacts from implementation of Alternative 2B.

Table 4-85. Summary of Alternative 2B Air Emissions

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC
Construction and Personnel Emissions	21,206.69	192.25	30.86	307.79	27.2	13.14
Total Aircraft and Ground Support Emissions	142,366.34	454.44	541.993	16.52953	44.70589	35.28501
Total Munitions Emissions	0.01	1.52	3.63	0	0.03	0
Total Emissions	**163,573.04**	**648.21**	**576.48**	**324.32**	**71.94**	**48.43**
Net change from No Action Alternative	**22,134.46**	**67.69**	**38.34**	**-138.81**	**8.11**	**-1.20**
ROI Emissions	--	*360,547*	*64,223*	*35,277*	*57,376*	*178,067*
Percent of ROI Emissions	--	*0.18%*	*0.90%*	*0.92%*	*0.13%*	*0.03%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

4.8.3.3 *Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field*

Construction and Personnel Emissions

Under Alternative 2C, air emissions impacts due to construction would be the same as those discussed previously for Alternative 2A. There would be no significant impacts to air quality as a result of implementing Alternative 2C.

Flight Operations

Table 4-86 displays air emissions for JSF aircraft under Alternative 2C. Emissions are shown for a Duke Field MOB and for auxiliary fields that would be used (Eglin Main Base and Choctaw Field). Table 4-87 provides a comparison of the air emissions associated with construction activities and incoming JSF personnel under Alternative 2C to the ROI's baseline emissions.

Table 4-86. Aircraft Emissions by F-35 Configuration – Alternative 2C

Alternative 2C		Emissions/Aircraft (tons per year)						Total Emissions (tons per year)					
Aircraft Type	Qty	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC
Duke Main Operating Base - Red Aircraft Emissions													
Red Air CTOL F-16	4	1	9.97	8.09	1.12	0.56	2.82	8,029.48	39.88	32.36	4.48	2.24	11
Red Air F-18 for CV JSF	4	222.23	4.72	0.45	0.54	0.06	1.82	888.92	18.88	1.8	2.16	0.24	7.3
Red Air F-18 for STOVL JSF	4	335.79	7.01	0.66	0.81	0.09	2.7	1,343.18	28.04	2.64	3.24	0.36	11
							Total Red Air Aircraft Emissions	**10,261.58**	**86.8**	**36.8**	**9.88**	**2.84**	**29**
Duke Main Operating Base - Training Aircraft													
CTOL Training JSF	24	1044.35	2.792	2.878	0.028	0.32	0.07	25,064.32	67.01	69.08	0.68	7.68	1.6
CV Training JSF	15	969.709	3.345	3.071	0.066	0.29	0.07	14,545.63	50.17	46.07	0.98	4.4	1
STOVL Training JSF	20	2,557.01	3.357	9.077	0.053	0.75	0.09	51,140.23	67.14	181.5	1.07	15.1	1.8
							Total Training Aircraft Emissions	**90,750.19**	**184.3**	**296.7**	**2.73**	**27.2**	**4.4**
Auxiliary Fields - Training Aircraft													
CTOL Training JSF	24	332.14	0.55	1.134	0.009	0.1	0.01	7,971.36	13.2	27.21	0.22	2.44	0.3
CV Training JSF	15	1,415.24	1.452	6.662	0.048	0.43	0.03	21,228.57	21.78	99.93	0.72	6.42	0.4
STOVL Training JSF	20	696.24	1.649	2.206	0.017	0.21	0.04	13,924.80	32.97	44.12	0.34	4.12	0.8
							Total Training Aircraft Emissions	**43,124.73**	**67.95**	**171.26**	**1.28**	**12.98**	**1.53**

CO = carbon monoxide; CO2-e = carbon dioxide equivalent; CTOL = conventional take-off and landing; CV = carrier variant; JSF = Joint Strike Fighter; NOx = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; Qty = quantity; SO2 = sulfur dioxide; STOVL = short take-off vertical landing; VOC = volatile organic compound

Table 4-87. Aircraft Emissions Associated With Alternative 2C Compared With the Region of Influence

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_X	PM_{10}	SO_2	VOC
Red Air	10,261.58	86.8	36.8	9.88	2.84	29.36
Duke Main Operating Base	90,750.19	184.3266	296.6903	2.726198	27.15442	4.378628
Outlying Field	43,124.73	67.9525	171.2603	1.276541	12.98323	1.525305
AGE	2,017.28	149.4316	42.27686	3.195723	3.071358	0.551046
Total	**146,153.78**	**488.51**	**547.0275**	**17.07846**	**46.04901**	**35.81498**
ROI Emissions	--	360,547	64,223	35,277	57,376	178,067
Percentage of ROI Emissions	--	*0.14%*	*0.85%*	*0.05%*	*0.08%*	*0.02%*

AGE = auxiliary ground equipment; CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Summary

Table 4-88 shows the annual emissions from all sources under Alternative 2C and a comparison to the baseline emissions under the No Action Alternative. Under Alternative 2C, emissions would increase over the No Action Alternative baseline. The largest increase would be in CO, which would increase by approximately 101.76 tpy. However, total emissions under Alternative 2C would still be minimal in relation to the ROI baseline emissions; the highest percentage is 0.92 percent for PM_{10}. Therefore, there would be no air quality impacts from implementing Alternative 2C.

Table 4-88. Summary of Alternative 2C Air Emissions

Emission Activities	Emissions (tons per year)					
	CO_2-e	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOC**
Construction and Personnel Emissions	21,206.69	192.25	30.86	307.79	27.2	13.14
Total Aircraft and Ground Support Emissions	146,153.78	488.51	547.03	17.08	46.05	35.81
Total Munitions Emissions	0.01	1.52	3.63	0	0.03	0
Total Emissions	**167,360.48**	**682.28**	**581.52**	**324.87**	**73.28**	**48.95**
Net change from No Action Alternative	**25,921.90**	**101.76**	**43.37**	**-138.26**	**9.46**	**-0.67**
ROI Emissions	--	*360,547*	*64,223*	*35,277*	*57,376*	*178,067*
Percent of ROI Emissions	--	*0.19%*	*0.91%*	*0.92%*	*0.13%*	*0.03%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

4.8.3.4 *Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field*

Construction and Personnel Emissions

Table 4-89 presents the emissions associated with construction activities under Alternative 2D. Table 4-90 compares emissions from construction and incoming JSF personnel with the ROI emissions.

Table 4-89. Estimated Construction Air Emissions Under Alternative 2D

Source Category		Emissions (tons per year)					
		CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Maximum Annual Construction Project Emissions	Acres Paved	0	0	0	0	0	0.01
	Demolition	0	0	0	0	0	0
	Grading Equipment	0	0	0	0.85	0	0
	Grading Operations	0	0	0	305.02	0	0
	Mobile Equipment	1,956.86	7.12	16.97	0.27	2.1	1.55
	Nonresidential Architectural Coatings	0	0	0	0	0	0.29
	Stationary Equipment	838.66	48.27	1.25	0.01	0.06	1.81
	Workers Trips	103.76	79.01	3.92	0.13	0	3.62
	Total	**2,899.28**	**134.4**	**22.14**	**306.28**	**2.16**	**7.28**

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; SO_2 = sulfur dioxide; VOC = volatile organic compound

Table 4-90. Percentage of Construction and Additional Personnel Emissions Associated With Alternative 2D Compared With the Region of Influence

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOCs
Construction Emissions	2,899.28	134.4	22.14	306.28	2.16	7.28
Point Source	10939.34	6.5	3.21	1.18	24.28	3.44
Mobile Source	7,008.25	8.11	3.36	0.25	0.76	0.35
Total	**20,846.87**	**149.01**	**28.71**	**307.71**	**27.2**	**11.07**
ROI Emissions	--	360,547	64,223	35,277	57,376	178,067
Percentage of ROI Emissions	--	*0.04%*	*0.04%*	*0.87%*	*0.05%*	*0.01%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Flight Operations

Table 4-91 displays air emissions for JSF aircraft under Alternative 2D. Emissions are shown for a Duke Field MOB and for auxiliary fields that would be used (Eglin Main Base and Choctaw Field). Table 4-92 compares the air emissions associated with construction activities and incoming JSF personnel under Alternative 2D with the ROI's baseline emissions.

Table 4-91. Aircraft Emissions by F-35 Configuration – Alternative 2D

Alternative 2D		Emissions/Aircraft (tons per year)						Total Emissions (tons per year)					
Aircraft Type	**Qty**	**CO_2-e**	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOC**	**CO_2-e**	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOC**
Duke Main Operating Base - Red Aircraft Emissions													
Red Air CTOL F-16	4	1	9.97	8.09	1.12	0.56	2.82	8,029.48	39.88	32.36	4.48	2.24	11
Red Air F-18 for CV JSF	4	222.23	4.72	0.45	0.54	0.06	1.82	888.92	18.88	1.8	2.16	0.24	7.3
Red Air F-18 for STOVL JSF	4	335.79	7.01	0.66	0.81	0.09	2.7	1,343.18	28.04	2.64	3.24	0.36	11
Total Red Air Aircraft Emissions								**10,261.58**	**86.8**	**36.8**	**9.88**	**2.84**	**29**
Duke Main Operating Base - Training Aircraft													
CTOL Training JSF	24	559.99	3.4	0.87	0.04	0.16	0.07	13,439.81	81.48	20.77	1.02	3.89	1.7
CV Training JSF	15	1,840.12	11.16	2.84	0.14	0.53	0.23	27,601.79	167.3	42.65	2.1	8	3.5
STOVL Training JSF	20	935.54	5.67	1.45	0.07	0.27	0.12	18,710.90	113.4	28.91	1.43	5.42	2.4
Total Training Aircraft Emissions								**59,752.50**	**362.3**	**92.34**	**4.55**	**17.3**	**7.6**
Auxiliary Fields - Training Aircraft													
CTOL Training JSF	24	464.21	0.58	1.68	0.01	0.14	0.01	11,141.02	14.04	40.39	0.30	3.41	0.34
CV Training JSF	15	1,398.58	1.48	6.60	0.05	0.42	0.03	20,978.66	22.26	98.94	0.74	6.34	0.43
STOVL Training JSF	20	777.39	1.50	2.51	0.02	0.23	0.04	15,547.89	29.93	50.16	0.36	4.67	0.77
Total Training Aircraft Emissions								**47,667.58**	**66.23**	**189.49**	**1.40**	**14.43**	**1.53**

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; CTOL = conventional take-off and landing; CV = carrier variant; JSF = Joint Strike Fighter; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; Qty = quantity; SO_2 = sulfur dioxide; STOVL = short take-off vertical landing; VOC = volatile organic compound

Table 4-92. Aircraft Emissions Associated With Alternative 2D Compared With the Region of Influence

Emission Activities	Emissions (tons per year)					
	CO_2-e	**CO**	**NO_X**	**PM_{10}**	**SO_2**	**VOC**
Red Air	10,261.58	86.8	36.8	9.88	2.84	29.36
Duke Main Operating Base	59,752.50	362.26	92.34	4.55	17.32	7.55
Outlying Field	47,667.58	347.25	88.51	4.36	16.6	7.23
AGE	2,080.28	154.10	43.60	3.30	3.17	0.57
Total	**119,761.94**	**950.41**	**261.25**	**22.09**	**39.93**	**44.71**
ROI Emissions	--	360,547	64,223	35,277	57,376	178,067
Percentage of ROI Emissions	--	*0.26%*	*0.41%*	*0.06%*	*0.07%*	*0.03%*

AGE = auxiliary ground equipment; CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Summary

Table 4-93 shows the annual emissions from all sources under Alternative 2D compared with the baseline emissions under the No Action Alternative. Under Alternative 2D, emissions would increase over the No Action Alternative baseline. The largest increase would be in CO, which would increase by approximately 520.42 tpy. However, total emissions under Alternative 2D would still be minimal in relation to the ROI baseline emissions; the highest percentage is 0.93 percent for PM_{10}. Therefore, there would be no air quality impacts from implementing Alternative 2D.

Table 4-93. Summary of Alternative 2D Air Emissions

Emission Activities	Emissions (tons per year)					
	CO_2-e	**CO**	**NO_x**	**PM_{10}**	**SO_2**	**VOC**
Construction and Personnel Emissions	20,846.87	149.01	28.71	307.71	27.2	11.07
Total Aircraft and Ground Support Emissions	119,761.94	950.41	261.25	22.09	39.93	44.71
Total Munitions Emissions	0.01	1.52	3.63	0	0.03	0
Total Emissions	**140,608.82**	**1,100.94**	**293.59**	**329.80**	**67.16**	**55.78**
Net change from No Action Alternative	**-829.77**	**520.42**	**-244.56**	**-133.33**	**3.34**	**6.15**
ROI Emissions	--	360,547	64,223	35,277	57,376	178,067
Percent of ROI Emissions	--	*0.31%*	*0.46%*	*0.93%*	*0.12%*	*0.03%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

4.8.3.5 *Alternative 2E – Duke Field Single Runway Plus Choctaw Field*

Construction and Personnel Emissions

Under Alternative 2E, air emissions impacts due to construction would be the same as those discussed previously for Alternative 2D. There would be no significant impacts on air quality as a result of implementing Alternative 2E.

Flight Operations

Table 4-94 displays air emissions for JSF aircraft under Alternative 2E. Emissions are shown for a Duke Field MOB and for auxiliary fields that would be used (Choctaw Field). Table 4-95 compares the air emissions associated with construction activities and incoming JSF personnel under Alternative 2E with the ROI's baseline emissions.

Table 4-94. Aircraft Emissions by F-35 Configuration – Alternative 2E

Alternative 2E		Emissions/Aircraft (tons per year)						Total Emissions (tons per year)					
Aircraft Type	Qty	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC
Duke Main Operating Base - Red Aircraft Emissions													
Red Air CTOL F-16	4	1	9.97	8.09	1.12	0.56	2.82	8,029.48	39.88	32.36	4.48	2.24	11
Red Air F-18 for CV JSF	4	222.23	4.72	0.45	0.54	0.06	1.82	888.92	18.88	1.8	2.16	0.24	7.3
Red Air F-18 for STOVL JSF	4	335.79	7.01	0.66	0.81	0.09	2.7	1,343.18	28.04	2.64	3.24	0.36	11
Total Red Air Aircraft Emissions								**10,261.58**	**86.8**	**36.8**	**9.88**	**2.84**	**29**
Duke Main Operating Base - Training Aircraft													
CTOL Training JSF	24	1,117.21	2.84	3.06	0.03	0.34	0.007	26,813.15	68.21	73.48	0.72	8.22	1.64
CV Training JSF	15	1,036.26	3.44	3.39	0.07	0.31	0.07	15,543.94	51.56	50.81	1.09	4.70	1.03
STOVL Training JSF	20	2,406.15	4.20	8.80	0.05	0.71	0.10	48,123.10	83.97	176.00	1.09	14.11	1.95
Total Training Aircraft Emissions								**90,480**	**203.74**	**300.30**	**2.90**	**27.03**	**4.62**
Auxiliary Fields - Training Aircraft													
CTOL Training JSF	24	292.28	0.40	1.08	0.01	0.09	0.01	7,014.77	9.62	25.89	0.19	2.15	0.23
CV Training JSF	15	1,253.14	1.11	6.00	0.04	0.38	0.02	18,797.12	16.60	89.94	0.60	5.68	0.31
STOVL Training JSF	20	645.28	0.47	2.97	0.01	0.20	0.01	12,905.52	9.44	59.43	0.27	4.02	0.21
Total Training Aircraft Emissions								**38,717.41**	**35.66**	**175.26**	**1.06**	**11.86**	**0.75**

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; CTOL = conventional take-off and landing; CV = carrier variant; JSF = Joint Strike Fighter; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; Qty = quantity; SO_2 = sulfur dioxide; STOVL = short take-off vertical landing; VOC = volatile organic compound

Table 4-95. Aircraft Emissions Associated With Alternative 2E Compared With the Region of Influence

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_X	PM_{10}	SO_2	VOC
Red Air	10,261.58	86.8	36.8	9.88	2.84	29.36
Duke Main Operating Base	90,480.19	203.74	300.30	2.90	27.03	4.62
Outlying Field	38,717.41	35.66	175.26	1.06	11.86	0.75
AGE	1,792.52	132.78	37.57	2.84	2.73	0.49
Total	**141,251.70**	**458.98**	**549.93**	**16.68**	**44.45**	**35.22**
ROI Emissions	--	360,547	64,223	35,277	57,376	178,067
Percentage of ROI Emissions	--	*0.13%*	*0.86%*	*0.05%*	*0.08%*	*0.02%*

AGE = auxiliary ground equipment; CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

Summary

Table 4-96 shows the annual emissions from all sources under Alternative 2E compared with the baseline emissions under the No Action Alternative. Under Alternative 2E, CO, SO_2, and VOC emissions would increase over the No Action Alternative baseline. The largest increase would be in CO, which would increase by approximately 498.87 tpy. However, total emissions under Alternative 2E would still be minimal in relation to the ROI baseline emissions; the highest percentage is 0.79 percent for PM_{10}. Therefore, there would be no air quality impacts from implementing Alternative 2E.

Table 4-96. Summary of Alternative 2E Air Emissions

Emission Activities	Emissions (tons per year)					
	CO_2-e	CO	NO_x	PM_{10}	SO_2	VOC
Construction and Personnel Emissions	20,846.87	149.01	28.71	307.71	27.2	11.07
Total Aircraft and Ground Support Emissions	141,251.70	458.98	549.93	16.68	44.45	35.22
Total Munitions Emissions	**0.01**	**1.52**	**3.63**	**0**	**0.03**	**0**
Total Emissions	**162,098.58**	**609.51**	**582.27**	**324.39**	**71.68**	**46.29**
Net change from No Action Alternative	**20,659.99**	**28.99**	**44.12**	**-138.74**	**7.86**	**-3.34**
ROI Emissions	--	*360,547*	*62,297*	*41,630*	*51,897*	*75,193*
Percent of ROI Emissions	--	*0.17%*	*0.93%*	*0.78%*	*0.14%*	*0.06%*

CO = carbon monoxide; CO_2-e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 microns; ROI = region of influence; SO_2 = sulfur dioxide; VOC = volatile organic compound

4.8.4 Mitigations

No specific measures have been identified as necessary to mitigate impacts to air quality at this time. However, should appropriate mitigations be identified through the adaptive management process, the Air Force may choose to implement them at that time.

4.9 HEALTH AND SAFETY

Tyndall AFB

Flight activities would remain similar to those currently conducted at Tyndall AFB and would be required to continue the applicable procedures outlined in the Tyndall AFB bird/wildlife-aircraft strike hazard (BASH) plan. Class A mishap and bird strike risks are expected to be proportional to the amount of training time in the airspace and not expected to be significant. Based upon experience with current training in the airspace and around the airfield, no significant impacts are anticipated to health and safety at Tyndall AFB as a result of JSF IJTS F-35 operations.

4.9.1 Alternative 1 – Eglin Main Base

4.9.1.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Construction and Ground Operations

Under Alternative 1A, munitions storage, maintenance, and loading facilities would be constructed at Eglin Main Base as discussed under the No Action Alternative and approved in the February 2009 ROD. As mentioned previously, the explosive safety quantity distances (ESQDs) would not impact any inhabited buildings or public roadways. Further, all requirements and procedures under Air Force Manual (AFMAN) 91-201 and the Explosive Site Plan (ESP) would be met and carried out. As such, there would be no impacts on explosives safety as a result of Alternative 1A.

No additional construction would occur under Alternative 1A; therefore, no unusual ground safety risks are expected from any of the activities associated with Alternative 1A.

Flight Operations

There would be no appreciable difference from what was previously discussed for the No Action Alternative. Though the frequency of ordnance deployment would increase under Alternative 1A, the types of munitions to be used are the same or similar to those discussed in the No Action Alternative, which historically have been used by the 33rd Fighter Wing and 96 TW (formerly the 46 TW). Alternative 1A would not utilize TA B-82 as under the No Action Alternative, but would continue to conduct munitions training involving large live and inert ordnance (GBUs/Joint Direct Attack Munitions [JDAMs]) at TAs C-52, B-70, and C-72. Strafing runs using 25-mm ammunition would be conducted at TA C-62 and B-75. All of the test areas to be used for F-35 munitions training on Eglin Reservation have been used for a number of years to conduct munitions testing and training with similar ordnance to that which would be used by the JSF.

Policies and procedures designed to maintain a safe environment when ordnance is being employed would be applied to JSF training as well. Adherence to Eglin Air Force Base Instruction (EAFBI) 11-201 and continued coordination with Eglin AFB's Safety Office, the Risk Management Board, Eglin Mission Control, and Range Operations Control Center, as well as Eglin EOD, would ensure that flight operations in which ordnance is used would be conducted in the safest manner possible. As the program matures, new procedures may be implemented to minimize risks associated with the F-35 and JSF training program as those needs are recognized.

As mentioned above, aircraft mishap rates associated with the F-35 have not yet been established. It can be expected that an increase in air operations overall could lead to a proportional increase in the occurrence of aircraft mishaps. Still, many policies and procedures are in place that serve to minimize risk and prevent aircraft mishaps. Again, should opportunities be identified to further minimize risks regarding the specific aircraft, these would be promptly incorporated into the JSF operating procedures.

4.9.1.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Construction and Ground Operations

Expansion runway construction under Alternative 1I has the potential to increase some of the hazards associated with explosive ordnance. The location of the runway to the north of Hwy 85 would require that military vehicles carry live ordnance from the existing munitions storage area (MSA) on Eglin Main Base across/over Hwy 85 to the new live ordnance loading area to be co-located with the expansion runway. Newly constructed live ordnance loading areas and hot cargo pads would be sited in such a manner that the ESQDs would not impinge on public roadways or inhabited buildings. Also, the taxiway would be designed and built to the precise specifications required in order to safely transport heavy aircraft and large quantities of live munitions. Only appropriate vehicles and trained personnel would be allowed to transport or otherwise handle live ordnance.

The transport of live munitions and taxiing of military aircraft across a busy public highway would increase concerns of public safety. Again, local fire response would need to be made aware of any specific issues or techniques required for dealing with potential incidents involving this and other aircraft as well as live ordnance. EOD personnel would also need to be aware of the types and quantities of ordnance to be transported should they be called to the scene of an incident.

Due to currently ongoing construction of the Hwy 85–Hwy 123 interchange in the vicinity of the proposed expansion runway, caution would need to be taken in the coordination of efforts to ensure safety of construction crews. Further, due to the high levels of traffic in that area, public safety should be a primary consideration through the duration of construction efforts. During construction, standard industrial safety standards, AFOSH standards, and best management practices (BMPs) would be followed. Employee safety orientations and regular safety inspections would help to ensure personnel safety. Potential hazards, including noise protection, heavy machinery operation, and other work-related hazards, would be evaluated and plans developed to ensure risk minimization. By acting within the current Air Force, state, and federal regulatory framework and through careful planning and implementation of BMPs, ground safety risks associated with Alternative 1I would be expected to be minimal and no adverse impacts are likely.

Flight Operations

Under Alternative 1I, the health and safety impacts would be very similar to those discussed above for Alternative 1A. While airfield operations would be distributed slightly differently over the MOB and auxiliary fields, and the MOB operations would in this case make use of the expansion runway as opposed to existing runways, overall the impacts would likely be the same.

Another concern is the possible BASH implications associated with the operations on the expansion runway. The proposed expansion runway is situated in between Garnier Creek, which parallels the runway to the west, and Toms Creek, which runs southeast from the north end of the proposed runway. Also, there are two existing ponds located to the east of the southern end of the runway near the intersection of Hwy 85 and General Bond Boulevard Wetland habitats are closely associated with the presence of birds and wildlife. The FAA recommends that the distance between aircraft movement areas, loading ramps, or aircraft parking areas should be at least 10,000 feet for airports serving turbine-powered (jet) aircraft (FAA Advisory Circular 150/5200-33). FAA Advisory Circular 150/5200-33 also recommends a distance of 5 statute miles between approach/departure airspace and wetlands if the wildlife attractant may cause hazardous wildlife movement into or across the approach or departure airspace. Although the distances are recommendations only, the standards are applicable to the Air Force through AFD-100107-009, a 2003 Memorandum of Agreement signed by the FAA, U.S. Air Force, U.S. Army, USEPA, U.S. Fish and Wildlife Service (USFWS), and U.S. Department of Agriculture (USDA).

Alternative 1I would locate the expansion runway approximately 1,700 feet from wetlands associated with Toms Creek to the north, 1,200 feet east of Garnier Creek wetlands near the southern tip of the runway, and touching a wetland area to the west of the northernmost quarter of the runway. However, Eglin Main Base's existing runways are located within 1,700 feet of five wetland areas, and the north end of RW-19 is located 380 feet from a wetland. Yet, from 1995 to 2005, Eglin Main Base averaged only roughly 27 bird/wildlife strikes annually, with just under 2 per year causing damage. It is likely that through continued coordination with the USDA and by implementing an adaptive management process, which may require future mitigation measures to be put into practice, the selection of Alternative 1I would not present a significant increase in BASH.

4.9.2 Alternative 2 – Duke Field

4.9.2.1 *Alternative 2A – Duke Field Parallel Runways and LHA Plus Choctaw Field*

Construction and Ground Operations

Alternative 2A would require the construction of new explosives handling facilities including munitions storage, a live ordnance loading area, hot gun pad, and munitions maintenance facilities. Duke Field has two existing ESQD zones. One surrounds the MSA in the northern portion of the installation, and the other surrounds a hot cargo area on Taxiway D (U.S. Air Force, 2001). Although the specific configuration is not available at this time due to the infancy of the project's planning and design, these facilities would be sited such that ESQDs would not encroach on existing ESQDs or any off-base areas that include inhabited buildings or public roads. In accordance with AFMAN 91-201, new ESP packages would be developed and submitted for the new facilities. The ESPs would illustrate the relationships and requirements between surrounding exposures and the facilities being sited. The construction of the new facilities would not have any adverse impacts.

Similar to Alternative 1I, Alternative 2A would include construction of a new runway to support JSF flight training. This alternative would also include the construction of an LHA deck and vertical landing pads to support F-35B (carrier variant [CV]) and F-35C short take-off vertical landing (STOVL) operations. Further, multiple new support facilities would be constructed in the western portion of the project area. The construction, while large in scope, would use only standard construction materials or methods. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable Air Force safety requirements, approved technical data, and AFOSH standards.

Construction would also include a new Emergency Services Facility. This facility would provide additional fire and rescue response capabilities to the flightline and other facilities at Duke Field. The addition of emergency personnel at the location would ensure that the high Air Force standards for safety continue to be met throughout the beddown and training mission of the JSF. All necessary procedures, including personal protective equipment, safety briefings, safety assessments, and corrective action plans, would be implemented to make certain that the safety of construction and JSF personnel is maintained. Specific procedures are also implemented for minimizing the risk of fire from range operations; therefore, implementation of the JSF flight training would not result in heightened ground safety concerns. There would be no unusual ground safety risks associated with Alternative 2A.

Flight Operations

The number of munitions training activities would be the same for all of the action alternatives proposed in this SEIS. Likewise, the same range Test Areas (TAs) (C-52, B-70, and C-72) for bombing missions and C-62 and B-75 for gunnery practice) would be used under all action alternatives. However, under all Alternative 2 subalternatives, munitions training activities would originate and terminate at Duke Field as the MOB. Because munitions handling facilities, maintenance crews, and emergency response would be located at the MOB, operations involving munitions would not be conducted at auxiliary fields except in the case of a required emergency landing.

As stated above, the Air Force has numerous policies and procedures in place to maintain the safest environment possible when munitions are being deployed. These measures would ensure that no impacts on public safety or JSF personnel would occur as a result of implementing Alternative 2A. Safety procedures should, however, be periodically evaluated and adjusted or augmented as deemed fit to specifically address the JSF flight training program as it develops.

The use of the expansion runway, as well as the increase in overall flight operations at Duke Field would create a need for additional ground safety personnel and emergency response crews. Also, the increase in munitions training operations on Eglin Reservation could increase the likelihood of wildfire. Eglin has cooperative agreements with local fire departments and fire risk minimization procedures are in place at each of the TAs so no significant impacts to ground safety are anticipated.

As mentioned previously, aircraft mishap rates associated with the newly developed F-35 have not been established. It is reasonable to expect that an increase in air operations would lead to a proportional increase in the occurrence of aircraft mishaps. Many policies and procedures are in place, which serves to minimize risk and prevent aircraft mishaps from taking place. As opportunities are identified to further minimize risks regarding the specific aircraft, these would be incorporated into the JSF operating procedures as expeditiously as possible.

The proposed expansion runway under Alternative 2A would be constructed in the vicinity of several wetland areas. The runway would sit approximately 1,840 feet east of a branch of Silver Creek and 2,230 feet west of a wetland associated with Honey Creek. The south end of the runway would be 2,515 feet from Juniper Creek wetlands and the north end 610 feet from Silver Creek wetlands. As discussed earlier, the proximity to wetlands is well within the FAA's recommended airfield siting criteria wetland buffer for airfields using jet aircraft. On the other hand, Eglin's existing runways are even closer to active wetlands and yet BASH occurrences have remained low over the years. Eglin has the procedures and personnel to effectively remove wildlife from the airfield and to minimize BASH risks. It is likely that Alternative 2A could be implemented without leading to a significant increase in bird/wildlife strikes.

4.9.2.2 *Alternative 2B – Duke Field Parallel Runways and LHA Plus Eglin RW 12*

Construction and Ground Operations

Expansion runway and JSF support facility construction under Alternative 2B would be the same as under Alternative 2A. Explosives storage, maintenance, and loading facilities would still be constructed at Duke Field and would continue to be handled in accordance with AFMAN 91-201 and the ESP. Thus, Alternative 2B would not adversely affect explosives safety.

Construction at Duke Field under Alternative 2B would be the same as that discussed under Alternative 2A. During construction, AFOSH requirements, standard industrial safety standards, and BMPs would be followed. Specific procedures are also implemented for minimizing the risk of fire from range operations; therefore, implementation of the JSF flight training would not result in heightened ground safety concerns. No unusual ground safety risks would be expected from these activities.

Flight Operations

Safety risks associated with JSF flight operations under Alternative 2B would be the same as for Alternative 2A. Although the number of air operations occurring at Eglin Main Base would be increased and those at Choctaw Field slightly decreased, munitions storage and maintenance would still be operated in accordance with AFMAN 91-201 and the ESP.

Ground safety and fire response would be increased at Duke Field and Choctaw Field similarly to Alternative 2A, and ordnance would be deployed on existing ranges where these types of munitions have been used historically.

Again, the total number of air operations would increase over the No Action Alternative. However, as previously stated with regard to Alternative 2A, while the likelihood of aircraft mishaps is expected to increase proportionally to the number of operations, the overall risk would still remain low. Highly skilled Air Traffic Control staff, trainers, maintenance personnel, and pilots are expected to continue the Air Force's excellent track record for aircraft safety.

Similarly, with the increase in flight operations and the creation of a new runway, the probability of bird/wildlife aircraft strikes also increases. Much like the Alternative 1I expansion runway, the overall risk is expected to remain low, and continued coordination with the USDA and bird monitoring would contribute to suppressing the number of BASH occurrences.

4.9.2.3 *Alternative 2C – Duke Field Parallel Runways and LHA Plus Eglin RW 12 and Choctaw Field*

Construction and Ground Operations

Expansion runway and JSF support facility construction under Alternative 2C would be the same as under Alternative 2A. Explosives storage, maintenance, and loading facilities would still be constructed at Duke Field and would continue to be handled in accordance with AFMAN 91-201 and the ESP. During construction, AFOSH requirements, standard industrial safety standards, and BMPs would be followed, and no unusual ground safety risks would be expected from these activities. Specific procedures are also implemented for minimizing the risk of fire from range operations; therefore, implementation of the JSF flight training would not result in heightened ground safety concerns. Thus, adverse impacts to health and safety are not likely under Alternative 2C.

Flight Operations

Safety risks associated with JSF flight operations under Alternative 2C would be the same as those under Alternative 2A. Although the number of air operations occurring at Eglin Main Base would be increased and operations at Duke Field and Choctaw Field would be slightly decreased, munitions storage and maintenance, ground safety, aircraft mishaps, and BASH would still be operated in accordance with the existing regulations and procedures discussed above. Safety would not be adversely affected by JSF flight training under Alternative 2C.

4.9.2.4 *Alternative 2D – Duke Field Single Runway Plus Eglin RW 12 and Choctaw Field*

Construction and Ground Operations

Impacts on explosives safety would be the same as those discussed under Alternative 2A. New munitions storage, loading, and maintenance facilities would be constructed in accordance with applicable regulations and in areas where no public roads or homes are located within the ESQDs. Thus, Alternative 2D would not adversely impact safety.

Alternative 2D would make use of existing airfields at Duke Field, Eglin Main Base, and Choctaw Field. Choosing Duke Field as the MOB for JSF flight training would still require construction of a number of support and munitions storage facilities. Construction would not include any nonstandard construction materials or methods. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable AFOSH standards, other Air Force safety requirements, and approved technical data.

All necessary procedures, including personal protective equipment, safety briefings, safety assessments, and corrective action plans, would be implemented to ensure that the safety of construction and JSF personnel is maintained. Specific procedures are also implemented for minimizing the risk of fire from range operations; therefore, implementation of the JSF flight training would not result in heightened ground safety concerns. There would be no unusual ground safety risks associated with Alternative 2D.

Flight Operations

Although Alternative 2D would make use of existing airfields, the overall number of air operations would be the same as under each of the action alternatives. Therefore, as was concluded previously, explosives safety and ground safety measures would be adjusted and/or increased to account for the additional operations and the likelihood of aircraft mishaps and BASH would increase relative to the increase in aircraft operations. However, with the implementation of the existing safety regulations, policies, and procedures outlined above, the overall impact on safety from implementing Alternative 2D is expected to be minor.

4.9.2.5 *Alternative 2E – Duke Field Single Runway Plus Choctaw Field*

Construction and Ground Operations

Under Alternative 2E, JSF support facilities would be constructed at Duke Field as discussed under Alternative 2D. Explosives storage, maintenance, and loading facilities would be constructed at Duke Field and would continue to be handled in accordance with AFMAN 91-201 and the ESP. During construction, AFOSH requirements, standard industrial safety standards, and BMPs would be followed, and no unusual ground safety risks would be expected from these activities. Specific procedures are also implemented for minimizing the risk of fire from range operations; therefore, implementation of the JSF flight training would not result in heightened ground safety concerns. Thus, Alternative 2E would not likely adversely affect health and safety.

Flight Operations

Under Alternative 2E, flight operations would increase at Duke Field and Choctaw Field. Still, as previously stated, a specific operating framework is in place to address explosives safety and ground safety and to minimize the risk of aircraft mishap or BASH occurrences. As operations would continue within the policies and procedures previously discussed and through continued interagency cooperation and coordination, impacts to safety from JSF flight training operations would be expected to remain insignificant.

4.9.3 Mitigations

No specific measures have been identified as necessary to mitigate impacts to health and safety at this time. However, should appropriate mitigations be identified through the adaptive management process, the Air Force may choose to implement them at that time.

4.10 SOLID WASTE

Potential impacts associated with solid waste would include the nonrecycled municipal solid waste (MSW) generated by new personnel at Eglin AFB and the construction and demolition (C&D) waste generated from demolishing, constructing, and renovating facilities to accommodate JSF operations.

4.10.1 Commonalities Across All Alternatives

Solid waste impacts from additional personnel would be the same as those discussed under the No Action Alternative (Chapter 3, Section 3.10.5).

Flight Operations

The impacts under all alternatives include the solid waste generated by the JSF flight training activities, including debris from training ordnance. The quantity of ordnance utilized by the various squadrons is listed in Chapter 2, Table 2-4, *Annual Ordnance Requirements for JSF Training*.

Maintenance

The evaluation of debris associated with the operations of the F-35 aircraft was conducted in the same manner as that specified for the No Action Alternative.

It was assumed that the solid waste and scrap metal debris from aircraft maintenance would be minimal and recycled where possible, which would not result in an impact on landfill capacity.

Munitions

As previously discussed under the No Action Alternative, the weight of each munition (less the explosive component for warheads) was estimated. The varying number of munitions and expected mass of debris generated from their use is presented in Table 4-97.

Table 4-97. Debris from Annual Munitions Use

GBU-12 Used	GBU-31 Used	GBU-32 Used	GBU-38 Used	25-mm Rounds Used	Total Debris Mass (tons)
272	62	79	95	114,977	204

GBU = guided bomb unit; mm = millimeter

The weights for the respective munitions less the explosive warheads (presented in Chapter 3, Section 3.10.5) were utilized to calculate the estimated mass of debris (e.g., GBU-12 – 602 pounds, GBU-31 – 1,580 pounds, and GBU-38 – 366 pounds).

Additional information pertaining to the GBU-31 and GB-38 munitions has become available since the FEIS was developed and is included here for refinement of the analysis. The GBU-31 comes in two variants, one that weighs 2,036 and another that weighs 2,115 pounds (U.S. Air Force, 2009d). Because the specific variant was not identified, the heavier variant was used for purposes of this analysis. The GBU-31 munition utilizes the BLU-109 bomb. Based upon the weight of the warhead (535 pounds) (Global Security, 2011) the weight of the GBU-31 was calculated to be approximately 1,580 pounds.

The GBU-38 weighs approximately 558 pounds (U.S. Air Force, 2009d). This munition utilizes the BLU-111 bomb (the Mk-82) that includes approximately 192 pounds of explosive in the warhead (Global Security, 20011a). Based on this information, the metallic portion of the GBU-38 was calculated to be approximately 366 pounds.

The GBU-32 would also be utilized under the action alternatives. The GBU-32 has a total weight of 1,013 pounds (U.S. Air Force, 2009d). This munition utilizes an Mk-83 or 1,000-pound bomb that includes an explosive component of approximately 385 pounds (Global Security, 2011). Based on this information, the net weight of the munition less the explosive warhead is estimated to be approximately 628 pounds. As discussed previously, the quantities of flares utilized was not calculated, as baseline data were not readily available, and are assumed to be incidental to the amount of debris generated from other munitions use.

The total quantity of debris generated during range operations from munitions is estimated to be 204 tons. The annual average amount of MSW (including debris) generated within Okaloosa, Santa Rosa, and Walton Counties from 2006–2010 was 609,397 tons. Based on that five-year annual average, the quantity of waste generated during range training operations would increase 0.03 percent. Therefore, based on projected training needs, training activities are not expected to result in the generation of sufficient waste quantities to affect current waste forecasts at Eglin AFB.

Munitions debris generated from training activities would be recovered and/or removed from the ranges for the purpose of storage, reclamation, treatment, and disposal as solid waste. These activities are ongoing at Eglin AFB because range operations are currently being conducted. The practices of recovery and removal of range debris are necessary for compliance with AFI 13-212, which requires the range to be cleared of munitions debris on a regular basis. It is anticipated that the bulk of the debris generated would be in the form of scrap metal, which would either be reclaimed or remain on the range. In addition, it is anticipated that most of the large debris associated with inert or active bombs would be recovered during range-clearing operations, while the small-sized debris associated with gun-fired ammunition or some types of ordnance (e.g., flares) would be too small to collect and would likely remain on the range.

4.10.2 Alternative 1 – Eglin Main Base

4.10.2.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Construction

Construction activities would be the same as those discussed under the No Action Alternative (Chapter 3, Section 3.10.5).

4.10.2.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Construction

This Alternative would require the construction of one new runway at Eglin Main Base and approximately 2,127 acres to be cleared for runway construction.

All facility construction with the exception of the new runway is addressed under the No Action Alternative (Chapter 3, Section 3.10.5). While construction of the new runway would result in the generation of land-clearing debris and concrete debris, the overall amount of material is expected to be limited. The runway is expected to be 2 million ft^2. Using the nonresidential construction debris generation rate (4.34 pounds per square foot [lbs/ft^2]), up to 4,340 tons of debris could be generated during this construction. This mass of debris is an increase of 2.14 percent debris generation within the tri-county ROI. It is anticipated that the bulk of this material would be unused concrete, paving material, and reinforcement steel that would be either recycled or reused, thereby lowering the overall quantity of expected debris.

All land-clearing debris is expected to be utilized within the paper/pulp industry, mulched for reuse, or burned on-site under a burn permit. Using these methodologies for management of land-clearing wastes, no material generated during land clearing is expected to require disposal.

4.10.3 Alternative 2 – Duke Field

Alternative 2 would require significant construction at Duke Field. Construction activities among Alternatives 2A, 2B, and 2C would be the same for any of those three Alternatives. Likewise, the construction activities among Alternatives 2D and 2E would be identical between the two Alternatives.

4.10.3.1 *Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways*

Construction

Approximately 10,418,510 square feet (ft^2) would be required in the form of hangars, field and runway construction, and infrastructure improvement to support operations at Duke Field. Approximately 22,608 tons of construction debris would be generated using the USEPA generation rate of 4.34 lbs/ft^2. The average annual quantity (2006–2010) of MSW generated in Okaloosa, Santa Rosa, and Walton Counties is 284,613 tons, 203,140 tons, and 121,644 tons, respectively. The aggregate average for all three counties is approximately 203,123 tpy, based on Florida Department of Environmental Protection (FDEP) data. Comparing the total estimated quantity of construction debris to the average quantity of MSW generated within the tri-county ROI indicates the debris would result in an increase in the annual solid waste generation rate of 11 percent.

This alternative includes the clearing of approximately 3,078 acres for construction of a parallel runway and support structures. All land-clearing debris is expected to be utilized within the paper/pulp industry, mulched for reuse, or burned on-site under a burn permit. Using these methodologies for management of land-clearing wastes, no material generated during land clearing is expected to require disposal.

4.10.3.2 *Alternatives 2D and 2E – Duke Field Single Runway*

Construction

Construction for Alternatives 2D and 2E would generate less debris than Alternatives 2A through 2C, as 3,250,000 ft^2 of runway and taxiway would not be constructed. Using the USEPA construction generation rate of 4.34 lbs/ft^2 and a construction footprint of 7,168,510 ft^2, approximately 15,556 tons of debris would be generated. This would result in an increase of approximately 7.7 percent to the annual generation rate of MSW within the tri-county ROI.

4.10.4 Mitigations

No specific measures have been identified as necessary to mitigate impacts to solid waste at this time. However, should appropriate mitigations be identified through the adaptive management process, the Air Force may choose to implement them at that time.

4.11 HAZARDOUS MATERIALS AND WASTES

This section discusses the environmental impacts of hazardous materials, hazardous waste, asbestos-containing materials (ACM), lead-based paint (LBP), and Environmental Restoration Program (ERP) sites. For a summary of the resource and affected environment, see Chapter 3, Section 3.11, *Hazardous Materials and Hazardous Waste.* For detailed information on the definition of the resource, applicable laws and regulations, and analysis methodology, see the FEIS, Chapter 3, Sections 3.10, 6.10, and 7.10.

The ROI for hazardous materials and hazardous waste for the Proposed Action is Eglin AFB, including all areas on the installation that store and/or use hazardous materials or generate and/or store hazardous waste. The ROI is not solely limited to specific areas associated with the components of the Proposed Action, because the impact of those actions may affect hazardous waste generation rates and management of hazardous wastes across the Eglin Reservation.

4.11.1 Commonalities Across All Alternatives

Flight Operations

The impacts from flight operations and munitions training are summarized in Table 4-98. There would be a slight increase in munitions-related wastes compared with the No Action Alternative (Section 3.11.5) but it would not be significant. No new Toxics Release Inventory (TRI) reporting thresholds would be reached, so there would be no significant environmental impacts from JSF flight training. Potential impacts from fuel releases would be the same as those discussed under the No Action Alternative.

Table 4-98. Munitions-related Wastes for All Action Alternatives

Chemicals	Total - JSF (lbs)[1]	Baseline Munitions Waste (lbs)[2]	Total Munitions Waste (lbs)	New EPCRA TRI Reporting Required
Antimony	3,600.81	251	3,852	No
Chromium	79.71	199	279	No
Copper	378.07	103,154	103,532	No
Lead	24.22	14,418	14,442	No
Manganese	1,944.21	1,195	3,139	No
Nickel	18.12	94	112	No

1. Source: DoD, 2009b
2. Source: U.S. Air Force, 2008a (the FEIS)
EPCRA TRI = Emergency Planning and Community Right-to-Know Act Toxics Release Inventory; JSF = Joint Strike Fighter; lbs = pounds

4.11.2 Alternative 1 – Eglin Main Base

4.11.2.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Construction

The environmental impacts as a result of construction activities under Alternative 1A would be the same as those under the No Action Alternative, Section 3.11.5.

All policies and procedures currently in practice on the base, including federal, state, and local law; rules; and regulations as well as the installation management plans, would be followed to ensure there would be no impacts from hazardous materials and waste under Alternative 1A.

4.11.2.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Construction

The site in which the expansion runway would be constructed has no existing structures that would be impacted; therefore, there are no potential impacts from ACM or LBP for this alternative. No ERP sites are located within the Alternative 1I runway construction site. One Area of Concern (AOC) is located within the proposed footprint. The AOC-50 site is a closed 0.5-square-mile spray field and has no detected elevated levels of contamination (U.S. Air Force, 2009b). Therefore, no adverse impacts are expected from construction-related hazardous materials or wastes under Alternative 1I.

4.11.3 Alternative 2 – Duke Field

4.11.3.1 *Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways*

Construction

The construction of the parallel runway and LHA would not include any existing structures; thus, there are no potential impacts from ACM or LBP under Alternatives 2A, 2B, or 2C. The proposed cleared and/or survey area includes a number of ERP, AOC, and Point of Interest (POI) sites (Table 4-99).

Sites of primary concern would be the active ERP sites: ST-69, SS-274/FT-27, and ST-55A. Currently these sites are all undergoing Interim Remedial Action and Interim Corrective Measures (ST-69), or Remedial Action (RA) and Corrective Measures Implementation (CMI) (SS274/FT-27 and ST-55A).

No impacts are anticipated from the presence of these ERP sites. As the table indicates, planned construction activities near existing ERP sites would be coordinated with Eglin's Environmental Restoration Branch to ensure no adverse impacts on these sites. Regardless, should any unusual odor, soil, or groundwater coloring be encountered during development activities in any areas, the Environmental Restoration Branch would be contacted immediately.

Table 4-99. Active ERP Sites Located Within or Adjacent to Alternative 2

Alternative Location	Site	Description	Status
2A, 2B, 2C, 2D, 2E	ST-69 – Building 3073, Waste Oil Tank	A site visit in support of the 1994 Area of Concern investigation noted stained soil along the route of occasional surface-water spillover runoff. This oil-water separator has been incorporated into the ongoing investigation of Environmental Restoration Program Site ST-69.	Interim Remedial Action (RA) and Interim Corrective Measures (ICM)
2A, 2B, 2C	SS-274/FT-27 Runway Ramp Spill Site	Site SS-274, the Duke Field Fire Training Area, is located east of the northwest–southeast runway adjacent to the wastewater treatment plant and approximately 1,000 feet south of Silver Creek. SS-274 was used for the training of fire protection personnel and for the disposal of waste fuels, oils, solvents, and contaminated fuels. The petroleum products were sprayed onto mock buildings, cars, and planes, then ignited and extinguished by the trainees. The duration of facility operations is unknown, but the site is no longer in use. Site SS-274 has a remedial system in place and will continue to operate until cleanup goals are achieved.	Remedial Action (RA) and Corrective Measures Implementation (CMI)
Duke Field and vicinity	ST-55A – Duke Field Tank Farm	Site ST-55, the Duke Field Tank Site, is a 1.75-acre fenced area that served as the petroleum storage facility until it was decommissioned in 2008. A JP-4 spill occurred on April 11, 1991, releasing approximately 1,850 gallons of fuel into an unlined soil dike. Site ST-55A has a remedial system in place and will continue to operate until cleanup goals are achieved.	RA (CMI)

Source: U.S. Air Force, 2009b

4.11.3.2 *Alternatives 2D and 2E – Duke Field Single Runway*

Construction

The proposed cleared/survey area would be similar to that described for Alternatives 2A, 2B, and 2C, thus the ERP, AOC, and POI sites would need to be considered during planning and construction activities. Coordination with the Environmental Restoration Branch for any construction activities near ERP sites is recommended. Should any unusual odor, soil, or groundwater coloring be found during development activities, the Environmental Restoration Branch would be contacted immediately.

4.11.4 Mitigations

No specific measures have been identified as necessary to mitigate impacts to hazardous materials at this time. However, should appropriate mitigations be identified through the adaptive management process, the Air Force may choose to implement them at that time.

4.12 PHYSICAL RESOURCES

Soils

Potential impacts on soils are associated with increased stormwater runoff and erosion resulting from ground disturbance consequential to these activities. Generally, soils within the affected environment are flat and sandy (allowing for permeation of water deposited on the surface before stormwater sheetflow occurs) and have natural vegetative cover characteristics not conducive to a highly erosive situation. However, land disturbance and the creation of impervious surfaces (i.e., roads, buildings, and compacted soil) can magnify the potential for erosion. The key issue of concern is the potential for the transport of soils through erosion caused by stormwater runoff from increased impervious surface areas. Quantifying the amount of soil that would potentially erode from a given area is difficult due to several variables. Many unpredictable factors affect erosion potential, such as the duration and intensity of storm events or the amount of vegetative loss. Consequently, the analysis focused on assessing the vulnerability of the soil types identified at alternative locations to erosion from construction and ground disturbance.

Water Resources

The potential effects on water resources described in Chapter 3 are included in this section. Appendix G, *Physical Resources,* discusses the analysis methodology used to determine the effects of the Proposed Action on water resources.

4.12.1 Commonalities Across All Alternatives

Flight Operations

Test Areas B-75 and C-62

JSF training would use TA B-75 for strafing training, but the majority of JSF strafing training would occur on TA C-62. Approximately 114,977 rounds of 25-mm ammunition are expected to be fired each year by JSF students and instructors.

Impacts on soil and water resources on TA C-62 from strafing would be sedimentation due to erosion and the possible leaching of metals into water systems from the corrosion of ammunition debris. Erosion would result from the maintenance of the target area, which must be kept free of vegetation. The 20-mm aircraft gunnery training target (TT-3) maintenance practices have previously caused severe erosion of the headwater stream slope of Burntout Creek and have altered wetland habitats (Burntout Creek Headwater). Over its years of use, the target surface has been kept free of vegetation to allow for pilot target approach recognition and recovery of projectile debris. In years past, recovery machinery similar to golf ball collection equipment was used to periodically retrieve surface gunnery debris (U.S. Air Force, 2002).

The increase in JSF flight training would not result in a change in vegetation management practices. The practice of keeping the area clear of vegetation would remain the same regardless of the number of munitions expended. Thus, the conditions that led to the erosion at the Burntout Creek headwater slope would not change as a result of increased JSF flight training. Debris retrieval would likely increase, but the equipment used does not result in more than minor surface soil disturbance. Besides keeping the target area free of surface debris, current debris retrieval procedures remove metals that could otherwise corrode and leach into soil and water.

As debris retrieval is an established practice and the increased number of rounds would be retrieved, adverse impacts on physical resources are not anticipated from JSF training at TA C-62 and TA B-75. Erosion already occurs at TA C-62 as a result of target area maintenance. Current maintenance practices would not change, and the erosion is not expected to worsen as a result of JSF training. Management practices for TA C-62 as identified in the *TA C-62 Programmatic Environmental Assessment* are listed below (U.S. Air Force, 2002). These would also apply to strafing targets at TA B-75.

- Monitor the test area: A monitoring plan should be developed to answer specific questions regarding the impact of the proposed training. The area of the test site should be monitored for all possible areas of impact. The monitoring should include, but not be limited to, chemical analysis of soils, groundwater monitoring, surface water monitoring, and endangered species surveys.
- Adhere to Eglin's Wildfire Specific Action Guide Restrictions for pyrotechnics use.
- No new cleared target areas should be established within 200 feet of any natural water body.
- Detonations of explosives should not occur within 200 feet of water bodies.
- If any ordnance lands in stream bank areas, it should be removed immediately in accordance with Air Force regulations.
- Conduct target and ordnance debris removal and disposal of solid debris from blanks and flares in accordance with Air Force regulations.
- Bullet containment, lead projectiles management, and lead reclamation should be employed to reduce lead concentrations.
- Vehicles should remain on roads or established tracks.

Test Areas C-52, C-72, and B-70

The maximum bomb ordnance use currently being considered involves the expenditure of 236 inert GBU-12 bombs and 36 live GBU-12 bombs; 62 inert GBU-31 bombs; 79 inert GBU-32 bombs; and 95 inert GBU-38 bombs expected to be dropped on TAs B-70, C-72, and TA C-52 each year by JSF students and instructors. Portions of all of these ranges are historically used for munitions training.

Erosion risks are minimal for most of these test areas, which are 78–99 percent composed of well-drained Lakeland soil, but soil disturbance during target construction would potentially result in erosion. Near streams, the terrain is more sloped and the soils mucky and less apt to drain. These Dorovan mucky soils, which are found in wetland areas of streams in each of these test areas, are acidic. Because of the acidity, moisture, and organic components of these soils, munitions dropped in these areas undergo more-rapid corrosion, which releases metals more readily into soil and groundwater.

Metals from munitions casings and other components would be periodically retrieved through existing range cleanup procedures. Soil and water impacts from increased JSF training on TAs C-52, C-72, and B-70 would not be considered adverse. Targets would not be established in slope or wetland areas.

4.12.2 Alternative 1 – Eglin Main Base

4.12.2.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Construction

No additional construction would take place under Alternative 1A; therefore, impacts would be the same as those discussed under the No Action Alternative. There would be no impacts on water resources under this alternative. Eglin Main Base, as the MOB proposed site, lies within the jurisdictional concerns of the FDEP under the Coastal Zone Management Act (CZMA). Coastal zone definitions, regulations, and requirements are discussed in Chapter 3, Section 3.12.4, *Physical Resources: Laws and Regulations.* The Air Force prepared a CZMA determination to address potential impacts on the coastal zone (Appendix I, *CZMA Determination*).

4.12.2.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Construction

This section addresses impacts on soil and water resources associated with constructing a single runway near Eglin Main Base.

Soils

The topography of the proposed project area is relatively flat with slopes that are less than 5 percent. The landscape is characterized by mild rises in land elevation, forming slight plateau-ridge features intermingled with mild slope-depression topography. Generally these features are indistinguishable to the naked eye under natural vegetated conditions. Soil types for this alternative are listed in Table 4-100.

Table 4-100. Alternative 1I – Soils Type and Attributes

Soil Name	Erosion Risk	Attributes	Soil Type	Alternative Coverage (acres [percent])
Lakeland Sand Slope 0-5%	Moderate	Yellowish brown to grayish brown	Sand	2,125 (100)

Source: Natural Resources Conservation Service, 2009

Lakeland sand is the primary soil type for this alternative. This sand type has the highest potential for erosion because it is unconsolidated sediment. The erosion potential is mitigated by several factors including slope. A more detailed description of the properties of Lakeland sand can be found in the FEIS's Appendix G, *Physical Resources*.

Soil types and the terrain for Alternative 1I (Figure 4-69) areas have a moderate susceptibility to erosion under natural vegetative cover and normal rainfall conditions. Because the slope factor for Lakeland sand in the alternative areas is very low (less than 5 percent), impact from erosion is expected to be low. The removal of any stabilizing vegetation and increases in impervious surfaces has the potential to increase the risk of soil erosion. Accordingly, soil BMPs should be implemented during construction. Discretionary BMPs such as silt fences and hay bales would be implemented during construction to avoid soil runoff into nearby drainages. BMPs should be inspected on a weekly basis and after rain events, with fencing replaced as needed. In project-specific permits and site plan designs, site-specific management requirements for erosion and sediment control would be implemented.

Water Resources

Surface Water

A branch of Toms Creek and a branch of Garnier Creek is located within the proposed project area for the new runway (Figure 4-70). The northern section of the new runway and associated runway overrun would come within 1,790 feet of Toms Creek and 100 feet of Garnier Creek. Toms Creek flows into Toms Bayou, which is a smaller surface-water resource that drains into Boggy Bayou and out into Choctawhatchee Bay.

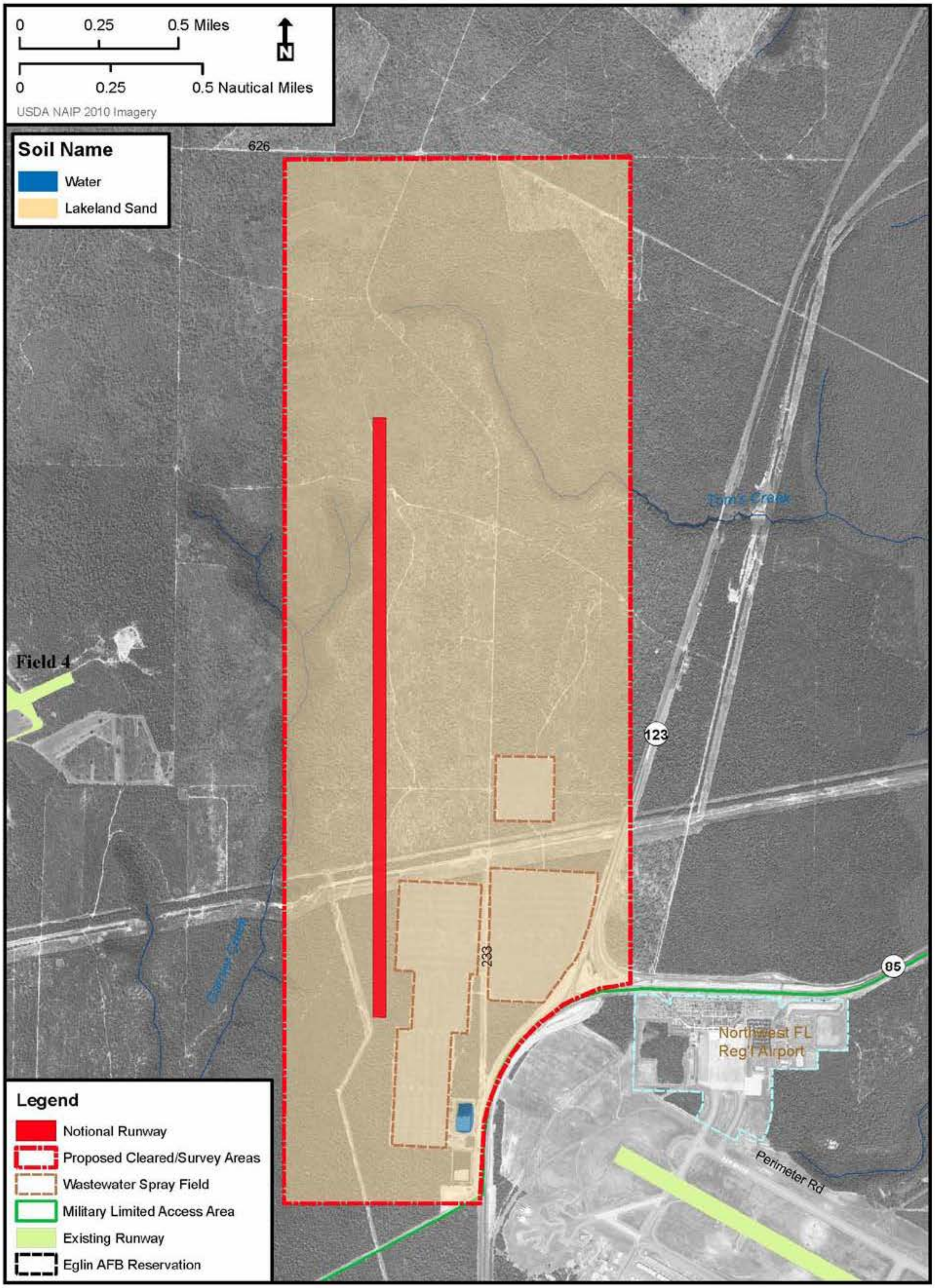


Figure 4-69. Soils Within Alternative 1I Project Area

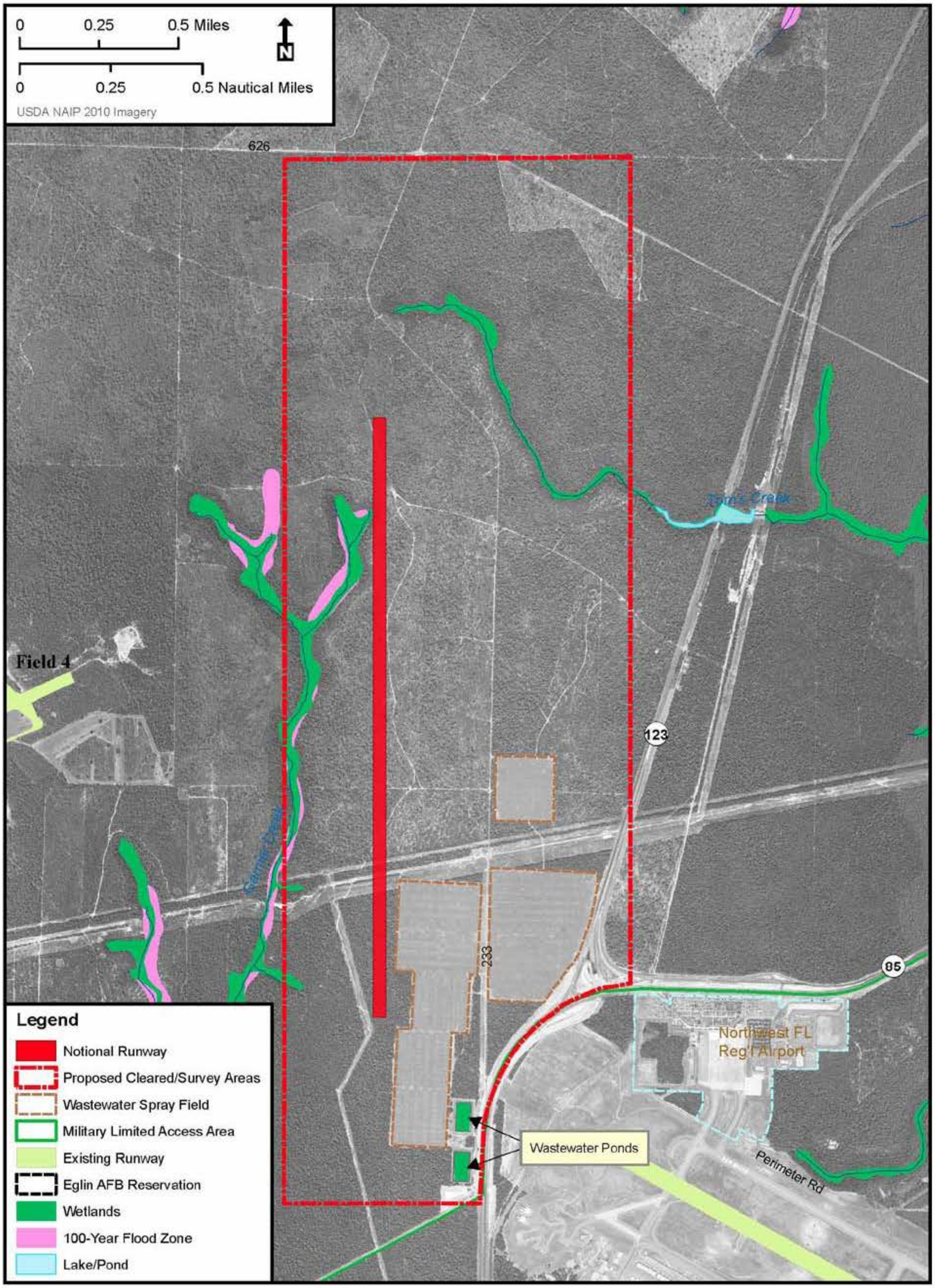


Figure 4-70. Water Resources – Alternative 1I

Toms Creek and Toms Bayou are not on Florida's 303(d) List of Impaired Surface Waters, but Boggy Bayou was put on the 1998 303(d) list because dissolved oxygen and nutrient levels were a parameter of concern (FDEP, 2006). Currently, this bayou is still on the 303(d) list for exceeding the Florida Department of Health's threshold for mercury concentrations in marine fish. A statewide Total Maximum Daily Load (TMDL) for mercury concentrations specific to Boggy Bayou is scheduled to be completed in 2012 (FDEP, 2009). Choctawhatchee Bay is also on the 303(d) list for many different parameters (FDEP, 2009).

Garnier Creek flows into Choctawhatchee Bay via Garnier Bayou in Okaloosa County north of Fort Walton Beach. This area drains to predominantly silviculture lands on Eglin's weapons test range. The presence of Eglin's WWTP sprayfield within the drainage system, recently cleared land for Field 4, and the placement of major electrical transmission lines across the creek may all contribute as potential nonpoint sources of pollution in the area in addition to the associated runoff impacts. Furthermore, the area's sandy soils are not typically conducive to nutrient removal (FDEP, 2003).

Garnier Bayou was included on Florida's 1998 303(d) List of Impaired Surface Waters because dissolved oxygen and nutrient levels were a parameter of concern (FDEP, 2006). Garnier Bayou remains on the list for exceeding the Florida Department of Health's threshold for mercury concentrations in marine fish. A statewide TMDL for mercury concentrations specific to Garnier Bayou is scheduled to be completed in 2012 (FDEP, 2009).

Construction-related erosion would potentially cause a short-term increase in sediment deposition into Toms Creek and Garnier Creek. A vegetative buffer of 100 feet established, or allowed to remain between the proposed runway and these creeks, would protect these waters from direct and indirect impacts of construction (USFWS, 2001). Toms Creek is almost 1,800 feet away from the proposed location for the runway and associated runway overrun, but is located within the area proposed for clearing. Garnier Creek is located approximately 100 feet from the northern portion of the proposed runway, which would accommodate the required buffer to prevent impacts on this surface-water body. Although these creeks occur within the proposed project area, construction activities would not occur within these water resources; therefore, there would be no direct impacts on surface-water bodies. Potential indirect impacts associated with water resources in this area concern stormwater runoff and are addressed below.

Wetlands and Floodplains

There are approximately 51 acres of wetlands and 31 acres of floodplains within the proposed project area for the new runway. These wetland areas are confined within the areas surrounding Toms Creek and Garnier Creek and are classified as palustrine, meaning they are nontidal wetlands with water depths less than 6.6 feet (2 meters) and ocean-derived salinities less than 0.5 parts per thousand (U.S. Air Force, 2007). The floodplain areas are associated with Garnier Creek, and are located adjacent to the northern section of the new runway. As mentioned above, the closest branch of Garnier Creek comes within 100 feet of the new runway; therefore, associated floodplain areas are also in close proximity to the new runway. Wetland and floodplain definitions, regulations, and requirements are discussed in the FEIS's Appendix G, *Physical Resources*.

Although wetland and floodplains are located within the proposed project area, construction activities within these resources would be avoided; therefore, there would be no direct impacts on wetlands or floodplains. Potential indirect impacts associated with water resources in this area relate to stormwater runoff and are addressed below.

Coastal Zones

The proposed sites for construction activities associated with establishing the MOB at Eglin Main Base and developing the new runway under Alternative 1I lie within the jurisdictional concerns of the FDEP under the CZMA. Coastal zone definitions, regulations, and requirements are discussed in the FEIS's Appendix G, *Physical Resources*. The Air Force has prepared a CZMA determination to address the impacts on the coastal zone (Appendix I, *CZMA Determination*).

Stormwater

Construction activities associated with establishing the MOB at Eglin Main Base under Alternative 1I would occur in areas that are developed and already contain stormwater provisions to handle stormwater runoff. Activities associated with constructing the new runway under Alternative 1I would occur at a site that is not developed; therefore, there are no manmade stormwater drainages or treatment areas to handle stormwater runoff. Construction of the new runway would be subject to stormwater permitting requirements such as those outlined in the FAC Rule 62-621 and FAC Rule 62-346.

As mentioned previously, potential indirect impacts associated with water quality relate to the potential for increased rate and volume of stormwater runoff, which would increase the amounts of sediment and pollutant runoff during and after rain events. The addition of new impervious surfaces associated with the construction of the new runway in an undeveloped area may also increase the number and kinds of pollutants carried off-site by stormwater runoff from everyday operations. Given the close proximity of Garnier Creek and surrounding wetlands and floodplain areas, these resources are more susceptible to impacts from the increased stormwater, sediment, and pollutant runoff associated with the construction activities for the new runway and the addition of new impervious surfaces.

The Natural Resources Conservation Service computer model, WinTR-55, was used to determine the effects of stormwater in regard to the proposed location of the new runway near Eglin Main Base. This model was used to evaluate stormwater runoff rates and volumes. Details on the model and parameters used can be found in Appendix G, *Physical Resources*. Stormwater totals were obtained utilizing the average rainfall of a 25-year rainfall event (one that theoretically occurs every 25 years and lasts for 24 hours), which is 10.23 inches.

Table 4-101 shows the current conditions (pre-construction) and conditions after construction (post-construction) obtained from the WinTR-55 model.

Table 4-101. Modeled Alternative 1I Single Runway Pre- and Post-Construction Stormwater Runoff Conditions

Outlet Modeled	Runoff [1] (inches)		Peak Flows [2] (ft^3/s)		Runoff Increases Due to Construction[3] (inches)
	Pre	Post	Pre	Post	
Toms Creek	1.32	7.37	411	3,448	6.05
Garnier Creek	1.96	7.37	714	2,980	5.41

ft^3/s = cubic feet per second

1. Modeled stormwater runoff amounts currently (pre) and after construction (post) in inches.
2. Modeled stormwater runoff peak flows currently (pre) and after construction (post) in cubic feet per second (ft^3/s).
3. Increases in stormwater runoff after construction (post) over current conditions (pre) in inches.

A 25-year rainfall event, raining uniformly over the Alternative 1I single runway site, would yield a total of 10.23 inches of water. This area, which is currently covered by vegetated soil, would soak up all but 1.32 inches of the rainfall, based on the permeability factors of the soils in the area. Stormwater that percolates downward into soil has the potential to carry roadway and other paved surface contaminants into the Sand and Gravel Aquifer (the Sand and Gravel Aquifer is not used as a drinking water source on Eglin AFB). The 1.32 inches of stormwater remaining would flow off-site at peak flows that are site specific and depend on elevation changes and drainage patterns. Clearing 2,095 acres of vegetation and converting an additional 46 acres (approximately 2,000,000 ft^2) of currently vegetated soil to an impervious surface for the single runway and associated runway overrun would result in increases in stormwater runoff amounts and peak flows. This runoff would potentially be transported to Toms Creek and Garnier Creek as well as over the surrounding land areas. The quantity of stormwater runoff generated at the Alternative 1I single runway site would increase, based on the modeled data presented in Table 4-101.

The USEPA provides guidance on acceptable stormwater runoff volumes and velocities as "to the extent practicable, maintain post-development peak runoff rate and average volume at levels that are similar to pre-development levels" (USEPA, 1993). Refer to Appendix G, *Physical Resources*, of the FEIS for a more detailed discussion. According to values obtained from the WinTR-55 model, the post-development peak runoff rate and average volume level would be greater than pre-development values, which could be perceived as adverse. However, the WinTR-55 model constructs a conservative view of effects, as it does not take into consideration certain variables such as the unique characteristics of different soil types. For example, the single runway site under Alternative 1I is undeveloped and the soils are composed mostly of Lakeland sands.

Undisturbed areas containing Lakeland sand have a high rate of permeability, up to 20 inches an hour, which is much greater than the 10.23 inches of rain that might be expected in a 25-year storm (Overing et al., 1995). Therefore, applying the "theorized" scenario (developed utilizing the WinTR-55 model as discussed above) to unique site characteristics, and assuming the Alternative 1I single runway site has never been developed or subjected to soil compaction, no adverse stormwater runoff is expected.

The creation of an impervious area would require the construction of stormwater management systems to provide on-site storage of stormwater. On-site storage of stormwater would prevent direct discharge of stormwater runoff to any surface waters, thereby reducing potentially adverse impacts on surface water quality (FDEP, 2008). However, infiltration from on-site storage systems can still result in the introduction of contaminants into the Sand and Gravel Aquifer via downward percolation through porous soils. Contaminants include nutrients such as nitrogen and phosphorus from fertilizers and natural sources, pesticides, and petroleum-related compounds from vehicle operations and metals, all of which are typical of urban runoff.

There would be no potable water contamination issues because the Sand and Gravel Aquifer is not used for this purpose at Eglin. Contaminants would not reach the Floridan Aquifer, which is the source of potable water on Eglin. The addition of stormwater infrastructure would not adversely impact the seasonal-high water table. Per FDEP requirements, the Air Force would implement a Stormwater, Erosion, and Sedimentation Control Plan; a Storm Water Pollution Prevention Plan (SWPPP); and construction BMPs to reduce stormwater runoff.

Applicable permitting requirements would be satisfied in accordance with FAC Rule 62-25 and the National Pollutant Discharge Elimination System (NPDES). The Air Force and any contractors would adhere to all applicable regulatory requirements, which would serve to either offset or minimize any potential impacts from construction operations. The Air Force would coordinate with Eglin's Natural Resources Section (NRS) to submit a notice of intent to use the Generic Permit for Stormwater Discharge under the NPDES program prior to project initiation, according to Florida Statute Section 403.0885.

The Alternative 1I construction activities would also require coverage under the Generic Permit for Stormwater Discharge from Large and Small Construction Activities, where one or more acres of land are disturbed (FAC Rule 62-621). The Air Force would incorporate a comprehensive Stormwater, Erosion, and Sedimentation Control Plan and an SWPPP into the final design plan. Stormwater permits and any necessary utility extension permits would require coordination between the proponent and the NRS. The Air Force would obtain all appropriate permits prior to the commencement of any ground-disturbing activities.

Based on model results and soil type considerations, no adverse impacts to water quality from implementing Alternative 1I are anticipated. The Air Force would obtain the aforementioned permits and would implement, as required by the FDEP, site-specific management actions and BMPs.

4.12.3 Alternative 2 – Duke Field

This section addresses impacts on soil and water resources from construction activities associated with establishing the MOB at Duke Field under all alternatives (2A, 2B, 2C, 2D, and 2E) and developing a parallel runway and LHA east of Duke Field under Alternatives 2A, 2B, and 2C. Similar to Chapter 3 and where necessary, the water resources are divided into two subsections: Duke Field and East of Duke Field. The Duke Field subsection addresses impacts from establishing Duke Field as the MOB under all alternatives. The East of Duke Field subsection addresses impacts from constructing a new runway and LHA under Alternatives 2A, 2B, and 2C.

4.12.3.1 *Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways*

Construction

Soils

The topography of the proposed project areas near Duke Field are relatively flat with gradual slopes less than 5 percent with increasingly severe slopes near drainages. The landscape is characterized by mild rises in land elevation that form slight plateau-ridge features intermingled with mild slope-depression topography. Generally, these features are indistinguishable under natural vegetated conditions. Soils types for this alternative are listed below and shown in Figure 4-71 (detailed soil descriptions are also provided in the FEIS Appendix G, *Physical Resources*). For comparative purposes, primary soils are presented in Table 4-102, showing attributes and the amount of acreage for each soil type.

Table 4-102. Alternatives 2A, 2B, and 2C – Soils Types and Attributes

Soil Name	Erosion Risk	Attributes	Soil Type	Alternative Coverage in acres (percent)
Dorovan Muck	Low	Dark brown to black, organic, very acidic	Muck with organics	46.3 (1.5)
Lakeland Sand Slope 0-5%, 5-12%, 12-30%	Moderate	Yellowish brown to grayish brown	Sand	2,650.7 (86.1)
Udorthents	Low	Ponding, very acidic, clayey	Loamy Sand	0.9 (.1)
Troup Sand	Moderate	Dark brown, fine sand	Sandy, Find Sand	380.1 (12.3)

Source: Natural Resources Conservation Service, 2009

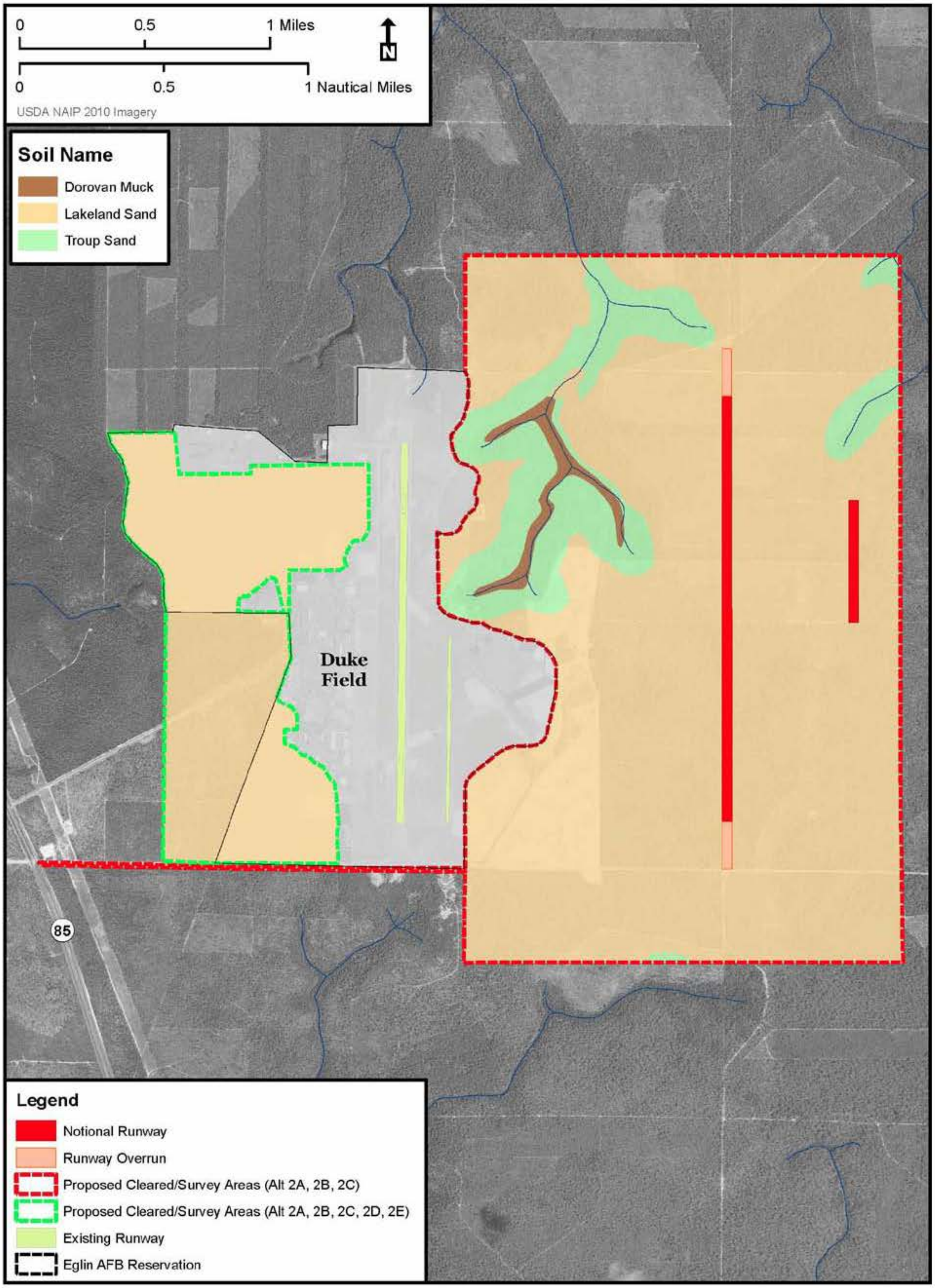


Figure 4-71. Soils Within Alternatives 2A, 2B, 2C, 2D, and 2E Project Areas

Soil types and the terrain for Alternatives 2A, 2B, and 2C areas have a naturally low to moderate susceptibility to erosion under natural vegetative cover and normal rainfall conditions. Because the slope factor for the four soil types in the alternative area (Lakeland, Urban, Troup, and Udorthents) is low (less than 5 percent), the impact of erosion is expected to be low. The removal of any stabilizing vegetation and increases in impervious surfaces have the potential to increase the risk of soil erosion. Discretionary BMPs such as silt fences and hay bales would be implemented during construction to avoid soil runoff into nearby drainages. BMPs should be inspected on a weekly basis and after rain events, with fencing replaced as needed. In project-specific permits and site plan designs, site-specific management requirements for erosion and sediment control would be implemented.

Water Resources

Surface Water, Wetlands, and Floodplains

Surface waters, wetlands, and floodplains on Duke Field and within the proposed construction areas under Alternative 2 are shown in Figure 4-72.

<u>Duke Field</u>

A small segment of Silver Creek is located within the northern portion of the Duke Field installation and is located approximately 520 feet away from the northern tip of the existing runway. Pearl Creek is located to the west of the installation, coming within 820 feet of the western border of Duke Field. Juniper Creek lies to the south of the installation, within 1,360 feet of the existing runway. None of these creeks are on Florida’s 303(d) List of Impaired Waters.

In addition, there are approximately 50 acres of wetlands around Duke Field. These wetland areas are associated with Pearl Creek and another low-lying area east of the northern section of Duke Field. No floodplain areas are located on the Duke Field installation.

Because construction within a specific water resource would be avoided, there would be no direct impacts on surface water, wetlands, or floodplains. Potential indirect impacts associated with water resources in this area relate to stormwater runoff and are addressed below.

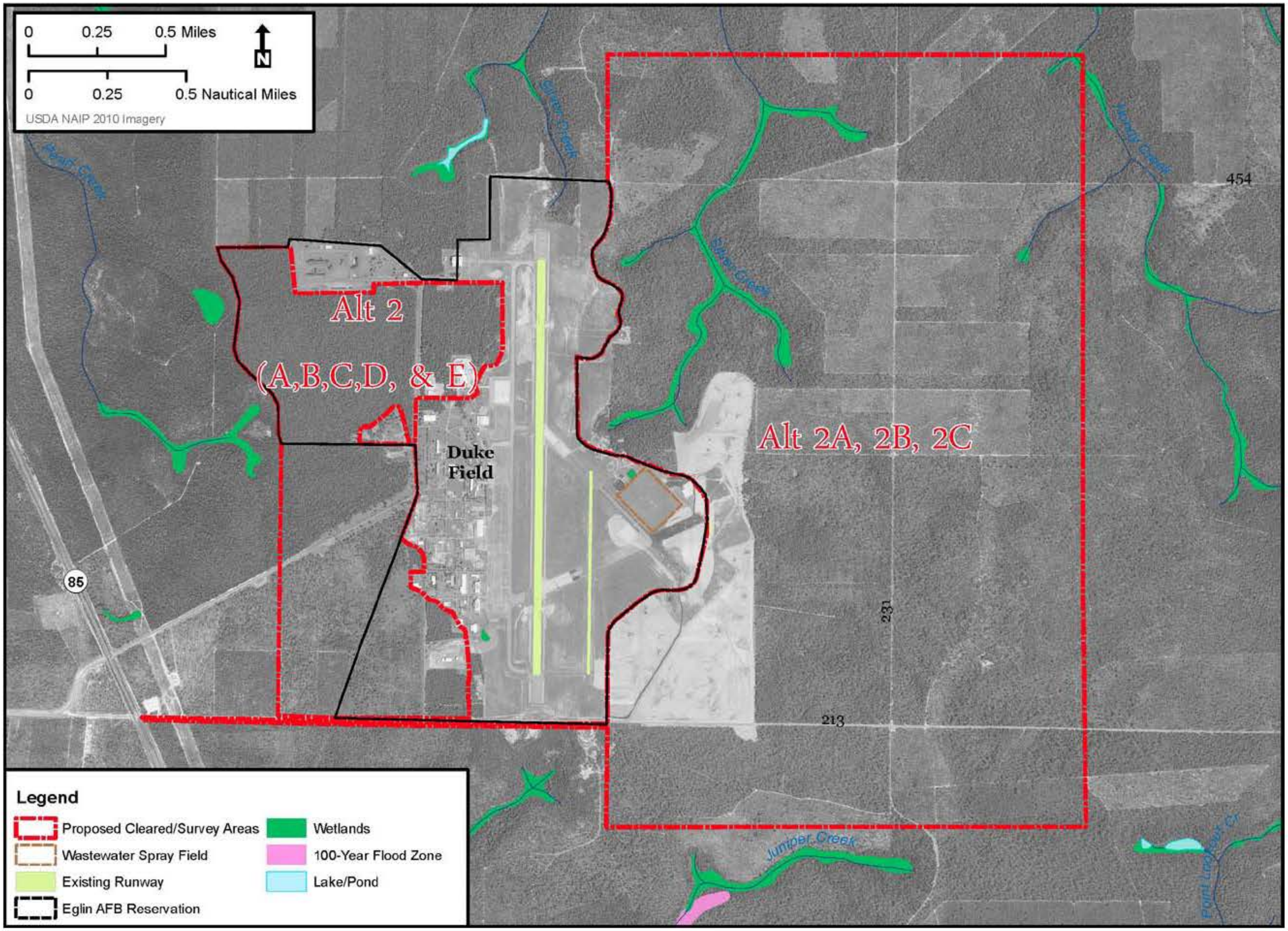


Figure 4-72. Water Resources – Alternative 2

East of Duke Field

Multiple branches of Silver Creek and Honey Creek lie within the proposed footprint area associated with the construction of an additional runway and LHA east of Duke Field. In addition, Juniper Creek is located just south of the proposed footprint area. Branches of Silver Creek are located to the north and west of the proposed runway and associated runway overrun. One branch of Silver Creek comes within 550 feet of the northern runway overrun and another branch comes within 1,480 feet to the west of the runway. One branch of Honey Creek approaches the northern tip of the LHA, coming within 1,170 feet of the proposed site. Although outside the proposed construction footprint, Juniper Creek is approximately 2,750 feet away from the southern runway overrun. None of these creeks are on Florida's 303(d) List of Impaired Waters.

There are approximately 50 acres of wetlands within the proposed construction footprint site for the new runway and LHA. These wetland areas are confined within the areas surrounding Silver Creek and Honey Creek, and are classified as palustrine (U.S. Air Force, 2007). No floodplain areas are located in the East of Duke Field area.

Construction activities not only for the runway and LHA but also for any new taxiways that may be required would not occur within any of these water resources. In addition, no floodplain areas are located on this site; therefore, no direct impacts on surface waters, wetlands, and floodplains would occur.

Coastal Zones

Construction activities associated with establishing the MOB on Duke Field under all Alternative 2 subalternatives and developing a parallel runway and LHA east of Duke Field under Alternatives 2A, 2B, and 2C lie within the jurisdictional concerns of the FDEP under the CZMA. Coastal zone definitions, regulations, and requirements are discussed in Appendix G, *Physical Resources,* of the FEIS. Eglin prepared a CZMA determination to address impacts on the coastal zone, which is included in Appendix I, *CZMA Determination*.

Stormwater

Duke Field

Construction activities associated with establishing the MOB on Duke Field would likely occur in undeveloped areas within the installation where no manmade stormwater drainages or treatment areas have been established. These activities would therefore be subject to stormwater permitting requirements such as those outlined in FAC Rule 62-621 and FAC Rule 62-346.

Using the same modeling methods that were described for Alternative 1I (Section 4.12.2.2), stormwater model results for construction activities associated with establishing the MOB at Duke Field as outlined under Alternative 2 are included in Table 4-103 below.

Clearing approximately 554 acres of vegetation and converting an additional 107 acres of currently vegetated soil to impervious surfaces for the Military Construction (MILCON) projects proposed to occur on Duke Field would result in increases in stormwater runoff amounts and peak flows. Furthermore, it was assumed that all construction activities would occur in undeveloped portions of Duke Field, meaning these areas may be subject to soil compaction. However, given that the Air Force would obtain permits and implement site-specific management actions such as implementing a Stormwater Erosion and Sedimentation Control Plan, an SWPPP, and BMPs, as detailed in Section 4.12.2.2 under Alternative 1I, Water Resources, no adverse impacts from stormwater runoff are expected.

Table 4-103. Modeled Alternative 2 Duke Field Main Operating Base Pre- and Post-Construction Stormwater Runoff Conditions

Area Modeled	Runoff [1] (inches)		Peak Flows [2] (ft^3/s)		Runoff Increases Due to Construction[3] (inches)
	Pre	Post	Pre	Post	
Duke Field MOB	1.45	7.50	316	2,508	6.05

ft^3/s = cubic feet per second; MOB = main operating base
1. Modeled stormwater runoff amounts currently (pre) and after construction (post) in inches.
2. Modeled stormwater runoff peak flows currently (pre) and after construction (post) in cubic feet per second (ft^3/s).
3. Increases in stormwater runoff after construction (post) over current conditions (pre) in inches.

East of Duke Field

The construction footprint for the new runway and LHA under Alternatives 2A, 2B, and 2C would occur in an undeveloped area; therefore, there are no manmade stormwater drainages or treatment areas to handle stormwater runoff. All construction activities in this area under these alternatives would be subject to all stormwater permitting requirements such as those outlined in FAC Rule 62-621 and FAC Rule 62 346.

Using the same modeling methods that were described for Alternative 1I (Section 4.12.2.2), stormwater model results for constructing a parallel runway and LHA under Alternative 2A are included in Table 4-104 below.

Using the analysis methods discussed for Alternative 1I (Section 4.12.2.2), and assuming the Alternative 2A parallel runway site has never been developed or subjected to soil compaction, no adverse stormwater runoff is expected. Furthermore, the Air Force would obtain permits and implement site-specific management actions as detailed in Alternative 1I, *Water Resources*.

Table 4-104. Modeled Alternatives 2A, 2B, and 2C Parallel Runway and LHA Pre- and Post-Construction Stormwater Runoff Conditions

Outlet Modeled	Runoff [1] (inches)		Peak Flows [2] (ft^3/s)		Runoff Increases Due to Construction[3] (inches)
	Pre	Post	Pre	Post	
Silver Creek	1.48	7.38	1,010	8,038	5.90
Honey Creek	1.42	7.37	274	1,942	5.95

ft^3/s = cubic feet per second; LHA = Landing Helicopter Amphibious
1. Modeled stormwater runoff amounts currently (pre) and after construction (post) in inches.
2. Modeled stormwater runoff peak flows currently (pre) and after construction (post) in cubic feet per second (ft^3/s).
3. Increases in stormwater runoff after construction (post) over current conditions (pre) in inches.

4.12.3.2 *Alternatives 2D and 2E – Duke Field Single Runway*

Impacts on water resources from construction activities associated with establishing the MOB at Duke Field are the same as those described in Section 4.12.3.1 under the Duke Field subsection for Alternatives 2A, 2B, and 2C.

4.12.4 Mitigations

To minimize the potential for impacts to groundwater, wetlands floodplains, and other surface water resources, the following management requirements would be employed under any of the alternatives:

- Do not alter natural flow patterns of streams by diverting water, causing siltation, or damming any portion of the stream or its tributaries.
- Vehicles and equipment must stay a minimum of 50 meters (164 feet) from the edge of slopes leading down to streams.
- For permitted off-road vehicle use: Do not drive vehicles in or across streams except at designated crossing points.
- Tree clearing of any species is not permitted unless approved by Eglin's NRS.
- Install and maintain entrenched silt fencing and hay bales along the perimeter of the construction site prior to any ground-disturbing activities and maintain them in effective, operating condition prior to, during, and throughout the entire construction process to prevent fill material, pollutants and runoff from entering wetlands or other surface waters.
- Maintain at least a 100-foot vegetated buffer between construction sites and surface waters.
- Incorporate a monitoring plan, especially after rain events, to observe the effectiveness of silt fencing, hay bales, and/or other erosion and sedimentation control devices and address modification as needed. Any failures would be carefully examined and corrected to prevent reoccurrence.

- Sequence construction activities to limit the soil exposure for long periods of time.
- Vegetate cleared/disturbed areas with native vegetation and grasses or mulch when the final grade is established to reduce/prevent erosion.
- Where applicable, reduce erosion using rough grade slopes or terrace slopes.
- Identify areas of existing vegetation that the proponent would retain and not disturb by construction activities.
- Chemicals, cements, solvents, paints, or other potential water pollutants would be stored in locations where they cannot cause runoff pollution.
- Any repairs, maintenance, and use of construction equipment (i.e., cement mixers) would take place in designated "staging areas" designed to contain any chemicals, solvents, or toxins from entering surface waters.
- Stabilize construction site entrance using FDOT-approved stone and geotextile (fiber fabric).
- Incorporate 10-year storm events into the design of facilities.
- Do not utilize septic tanks.
- Equip all work sites with adequate waste disposal receptacles for liquid, solid, and hazardous wastes to prevent C&D debris from leaving the work site.
- Utilize proper site planning, low-impact design principles, and adequately engineered stormwater retention ponds (or swales) to manage stormwater (on-site) and prevent discharges into nearby surface waters. The design would take into consideration the landscape of the area and physical features to determine whether a retention pond or series of swales would be used to contain runoff. In accordance with FDEP regulations, a Florida-registered Professional Engineer would design the proposed retention feature.
- Incorporate into the design and construction of paved surface areas a slope sufficient enough to direct potential runoff away from wetland areas. Design and construct all drainage improvements and related infrastructure in such a manner that the natural hydrologic conditions would not be severely altered.
- Do not use wetlands and other water bodies as sediment traps.
- Design open channels and outfall ditches to include plans so that they do not overflow their banks.
- Where flow velocities exceed 2 cubic feet per second, provide ditch pavement or other permanent protection against scouring. Revegetate all ditches not protected with a permanent material to provide an erosion resistant embankment.

- Treat runoff from parking lots to remove oil and sediment before it enters receiving waters.
- Provide all construction personnel with proper training regarding all management techniques.

4.13 BIOLOGICAL RESOURCES

4.13.1 Commonalities Across All Alternatives

Munitions Use

Under Alternative 1A, JSF munitions training would be similar to what was already discussed under the No Action Alternative (Section 3.13.5) and analyzed in detail in the FEIS. The JSF would continue to conduct strafing runs on TA C-62 and TA B-75 using existing targets. Under this alternative and all other action alternatives, however, live GBU-12 munitions would be supported on TA C-52 and inert GBU-12/31/32/38s would be employed on TA C-52, TA B-70, and TA C-72. Munitions training would no longer utilize TA B-82. Although the numbers and types of munitions expended on TA C-52E, TA-C-62, and TA B-75 areas would differ slightly from the No Action Alternative analysis, because these areas are already characterized by munitions testing and training and quality habitat is abundant in the vicinity, impacts on these test areas are not expected to differ from those of the No Action Alternative, and impacts on sensitive species and habitats are not likely to be significant.

Many inactive and active red-cockaded woodpecker (RCW) trees and foraging areas are located near TA C-72 and TA B-70 and within TA C-52. However, as previously noted, current research shows that RCWs can thrive and successfully nest and breed in areas of high noise, and the likelihood of direct physical impacts on active cavity trees at any of these test areas is very low. RCWs continue to thrive in noisy test areas and exist near TA B-70 in areas exposed to noise from sonic booms. Still, the potential for noise impacts on RCWs exists and could result in nonlethal harassment. RCWs would be most sensitive during nesting season (April 1 to July 1); noise could directly affect eggs and could cause nest abandonment by adults.

JSF explosives and munitions activities would increase wildfire activity at TAs B-70, C-52, and C-72, likely requiring additional wildland fire positions to respond to the increased number of wildfires. The test areas where JSF live munitions would be released have been used for years as bombing and strafing ranges. These test areas have regular mission-related fires, which keep fuel levels low and “hot” fires to a minimum. These test areas have good RCW habitat around them, as demonstrated by the number of RCW clusters in the surrounding areas. With implementation of Eglin’s latest Integrated Natural Resources Management Plan (INRMP), a number of no suppression and restricted suppression zones have been incorporated for wildfire suppression. The increased munitions use on the ranges mentioned above would be likely to increase the frequency of wildfires in the no suppression zone on TA B-70 and potentially the nearby restricted and no suppression zones in the vicinity of A-77, 78, and 79 and B-82. Likewise, mission-caused wildfires are likely to increase in the restricted and no suppression zones on TA C-52. Because there are no restricted or no suppression zones immediately adjacent to TA C-72, wildfire response would not be inhibited, and no increase in wildfire impacts is to be expected.

Eglin's NRS conducted an Endangered Species Act (ESA) Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*). In order to minimize adverse effects, munitions use would comply with Eglin's Wildfire Specific Action Guide Restrictions contained in wildfire operational plans developed by Eglin's NRS.

The TA C-52 Complex and TA C-72 both contain Okaloosa darter streams. Okaloosa darters may be affected by sediment runoff due to exposed soils and munitions use on TA C-52 and TA C-72. Practices to reduce soil erosion into Okaloosa darter creeks are necessary to protect this habitat. Minimizing the placement of targets on sloped areas and maintaining a minimum of 100 feet of vegetated buffer along streams would reduce the potential for sedimentation in Okaloosa darter streams. With implementation of erosion prevention measures and other potential mitigations listed in Section 4.13.4, JSF munitions use would not be likely to adversely affect the Okaloosa darter.

Numerous gopher tortoise burrows exist on TA B-70, and some are also present on TA C-52, and could potentially be affected by JSF munitions training. However, quality habitat appears to outweigh any negative impacts of bombing. Gopher tortoises also receive protection from noise and physical impacts through their use of burrows. Therefore, impacts on the gopher tortoise from JSF munitions use would not be significant.

The Florida bog frog has been noted on TA B-70 in the vicinity of Live Oak Creek. Bog frogs are not likely to be affected by noise or direct physical impacts. Similar erosion control measures as discussed above with respect to Okaloosa darter streams would decrease the likelihood of any potential impact on bog frog habitat. Therefore, impacts on the bog frog from JSF munitions training would not be significant.

Biological surveys have shown the Florida burrowing owl to inhabit TA B-70. These small owls construct burrows similar to gopher tortoises or use abandoned gopher tortoise burrows. These species continue to nest successfully on and near TA B-70 despite the noise from TA B-70 missions; the presence of suitable habitat appears to outweigh any negative influences associated with mission-related noise. Direct physical impacts would be possible from munitions. Examination of burrow locations in relation to targets revealed that the likelihood of direct encounters was very low (U.S. Air Force, 2009e).

Tyndall AFB

Wildlife that continue to live near airfields are likely accustomed to the types of noise and vibration disturbances produced by missions and are not deterred by the disturbance as long as the habitat is suitable. Marine mammals could experience stress responses when exposed to aircraft overflights, and potentially vacate or avoid areas of persistent noise. However, aircraft noise would be mobile and transient and would not persist in any given area. In addition, only animals at or near the surface coincident with an overflight would be affected. Therefore, the proposed changes in noise levels by the F-35 associated with the JSF IJTS would not be significantly different from those conditions in the *F-22 EA* and are not expected to affect any threatened or endangered species populations.

4.13.2 Alternative 1 – Eglin Main Base

4.13.2.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Construction

Construction activities under Alternative 1A would be almost identical to those discussed for the No Action Alternative. Therefore, no biological resources impacts are expected from implementing construction activities under Alternative 1A.

Flight Operations

By removing the flight restrictions on RW 19 put in place by the February 2009 ROD (i.e., the No Action Alternative), the total area affected by noise levels of 65 dB or greater would increase; therefore, Southeastern American kestrels, bald eagles, and migratory birds may be subject to higher noise levels, existing research (such as that described in the FEIS, Chapter 7, Section 7.12.1.2) suggests that they would not be adversely affected by JSF flight operations under Alternative 1A.

Likewise, terrestrial species of concern such as the Florida black bear and reptile and amphibian species could be exposed to higher noise levels than they have historically experienced. However, sensitive species located on Eglin AFB have become accustomed to aircraft noise, and the gradual increase in JSF-related noise would allow species time to acclimate to the increased noise.

As discussed under the No Action Alternative, domestic animals are not expected to be impacted by increased aircraft noise.

Overall, Alternative 1A is not likely to adversely affect the federally listed RCW, and impacts on other sensitive species and habitats would not be significant.

4.13.2.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Construction

Land clearing and daily operations may have a localized effect on native terrestrial wildlife species such as squirrels, raccoons, and rabbits. However, these species would either move to another location or remain within the area and use remaining foliage for habitat. In addition, the proposed areas represent only a small percentage of the total land area that Eglin maintains.

Two stream systems fall within the area that would be cleared for the Alternative 1I runway. Land clearing has the potential to increase erosion of stream slopes and increase sedimentation in these streams. The most effective method to minimize these impacts would be to leave a vegetated buffer along the streams. Buffers help to maintain the health of aquatic communities in many ways; buffers of as little as 100 feet provide the following benefits: (1) maintenance of stream temperature; (2) contribution of large woody debris habitat; (3) maintenance of diverse stream invertebrates; and (4) removal of excess sediment, nitrogen, phosphorus, and other contaminants (USFWS, 2001). Larger buffers (300 to 1,000 feet) additionally provide benefits for reptiles, amphibians, interior forest species, and migrating birds (e.g., quality foraging habitat) (USFWS, 2001).

During the site design process, Alternative 1I runway clearing would be modified to avoid aquatic habitats and to provide as much riparian buffer as possible; clearing and construction operations would observe all buffer requirements and erosion control measures resulting from permits. Impacts on terrestrial and aquatic wildlife would not be significant under any of the alternatives.

Flora and Fauna

The Sandhills ecological association is the largest ecological association found within the Alternative 1I project area, with smaller interspersed areas of open grassland/shrubland, wetland/riparian, and landscaped/urban areas present (Figure 4-73).

Table 4-105 depicts the acreages of ecological associations found within the ROI. A list of the typical species found within each of these associations is in the Appendix H, *Biological Resources*.

Based on Eglin geographic information system (GIS) data (Eglin GIS, 2009), no invasive species have been documented within the ROI.

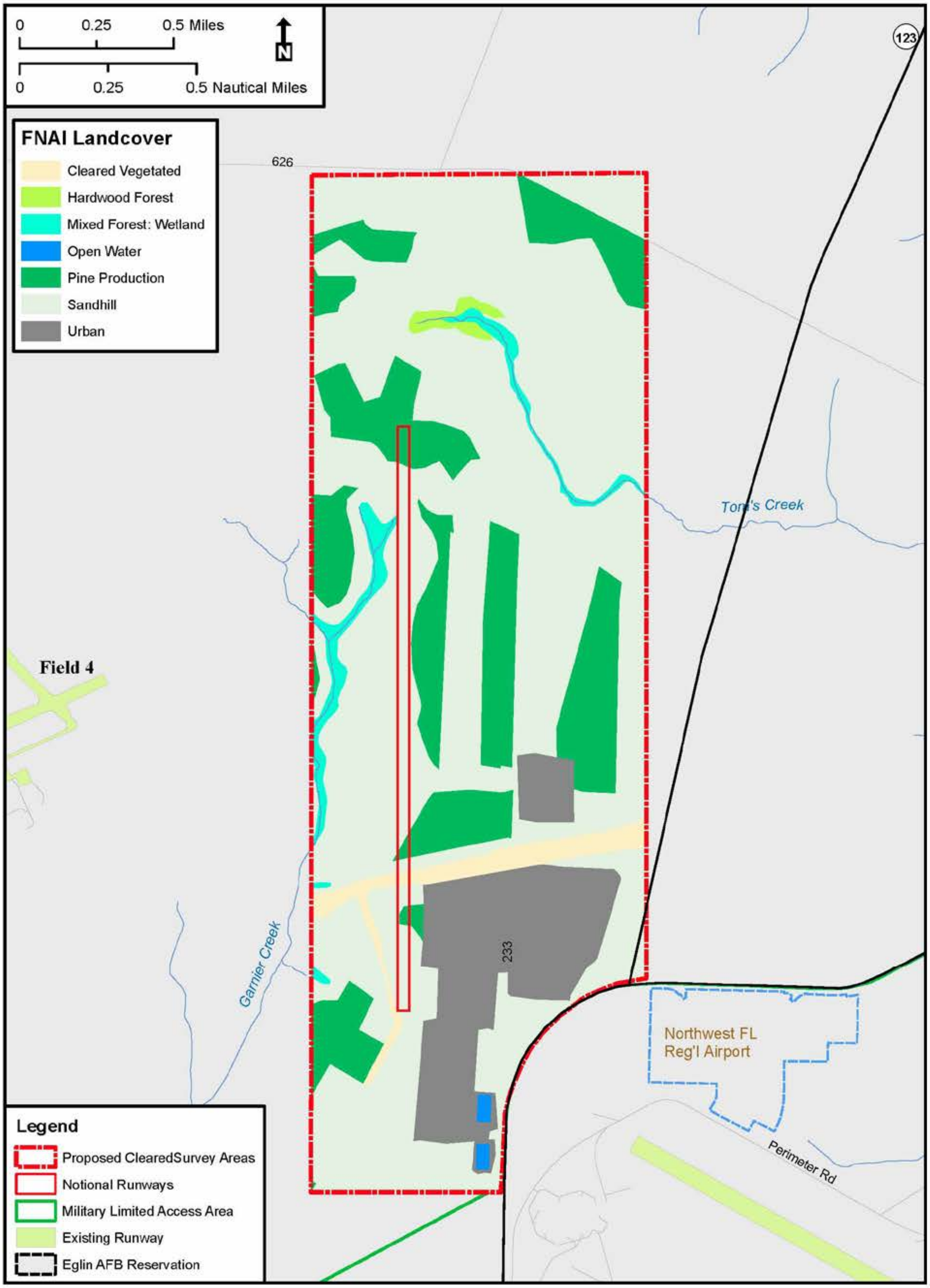


Figure 4-73. Ecological Associations Found on or Near Alternative 1I Project Area

Table 4-105. Acreage of Ecological Associations Found Within the Alternative 1I Project Area

Ecological Association	Acres	Percent of Region of Influence
Sandhills	1,784	83.87
Landscaped/Urban	236.9	11.14
Grasslands/Shrublands	55.9	2.63
Wetland/Riparian	50.2	2.36
Total	**2,127**	**100**

Sensitive Habitats and Sensitive Species

Based on existing information, species documented to occur or that may potentially be present within the Alternative 1I site are identified in Table 4-106. Florida black bears have historically been sighted on Eglin Main Base, mainly concentrated to the southern to western portion of the base (Eglin GIS, 2009). In the Sandhills habitat, there is the potential for gopher tortoises, eastern indigo snakes, and Florida pine snakes; however, due to fire suppression and the surrounding urban landscape, it is unlikely (Figure 4-74).

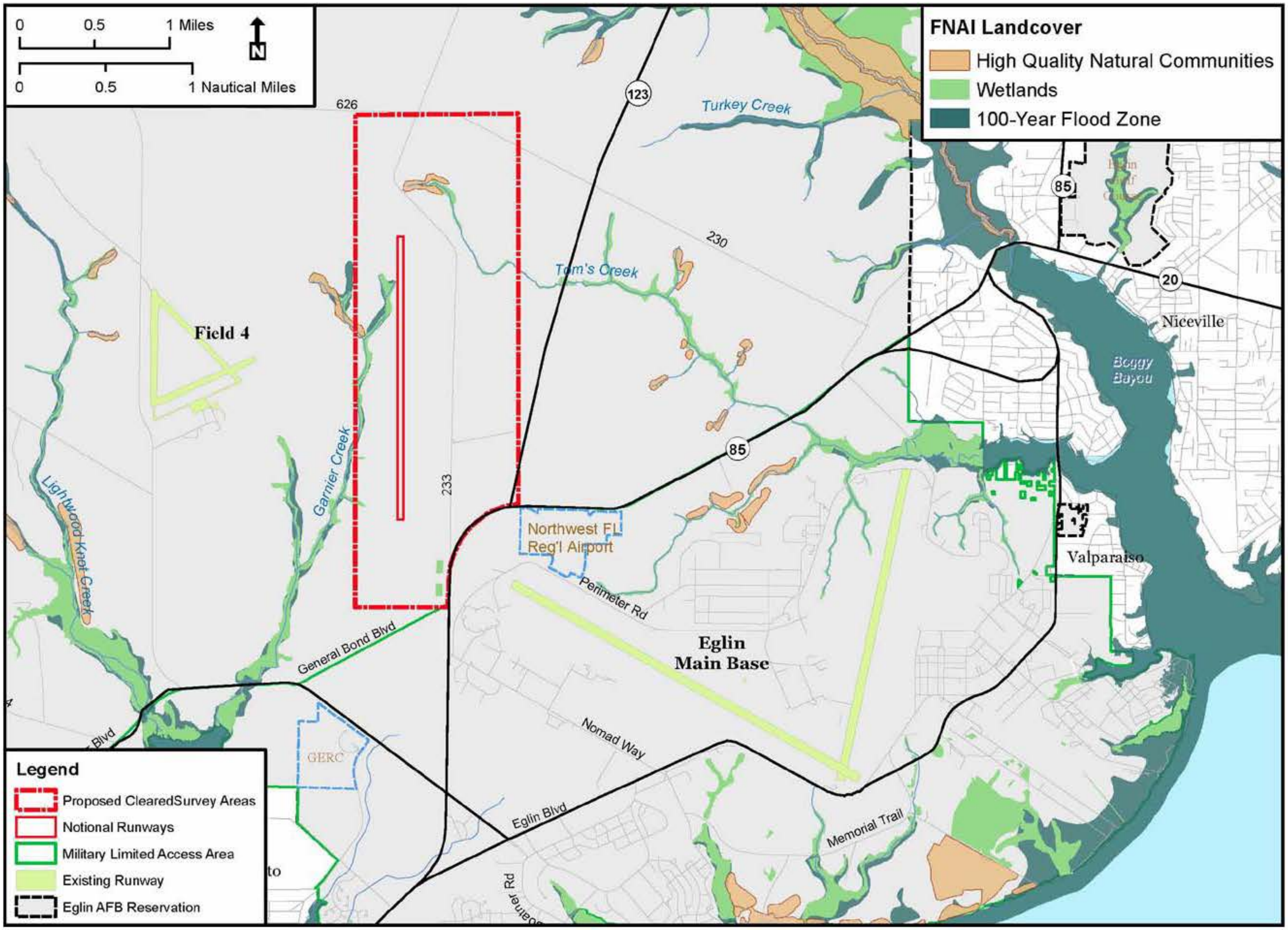
Table 4-106. Eglin Main Base – Sensitive Species Potentially Occurring In or Near the Alternative 1I Project Area

Scientific Name	Common Name	Status	Alternative
Fish			
Etheostoma okaloosae	Okaloosa darter	FE, SE	1A, 1I
Birds			
Picoides borealis	Red-cockaded woodpecker	FE, SSC, MBTA	1A, 1I
Falco sparverius paulus	Southeastern American kestrel	ST, MBTA	1A, 1I
Reptiles			
Drymarchon corais couperi	Eastern indigo snake	FT, ST	1A, 1I
Gopherus polyphemus	Gopher tortoise	ST	1A, 1I
Pituophis melanoleucus	Florida pine snake	SSC	1A
Mammals			
Ursus americanus floridanus	Florida black bear	ST	1A, 1I
Plants			
Quercus arkansana	Arkansas oak	ST	1A, 1I
Tephrosia mohrii	Pineland Hoary Pea	ST	1A, 1I
Carex baltzelli	Baltzell's Sedge	ST	1A, 1I
Platanthera clavellata	Green wood orchid	SE	1I

Sources: Eglin GIS, 2009; Entrix, 2009

FE = federally endangered; FT = federally threatened; MBTA = Migratory Bird Treaty Act; SE = state endangered; ST = state threatened; SSC = state species of special concern

Figure 4-74. Alternatives 1A and 1I – Sensitive Habitats



Approximately 14 acres of upland hardwood forest High Quality Natural Communities (HQNCs) are found along Toms Creek and Garnier Creek in the northern portion of the Alternative 1I project area (Figure 4-75, Eglin GIS, 2009). In total, there are three inactive RCW trees and approximately 6,220 feet of Okaloosa darter stream (Toms Creek) within the Alternative 1I ROI. Gopher tortoise burrows and RCW foraging habitat are documented outside of the ROI immediately north and northwest of the project area boundary, respectively. Due to the habitat type, Florida black bear, Florida pine snake, Southeastern American kestrel, and gopher tortoise may utilize the area. Further, due to their strong association with the use of gopher tortoise burrows, the eastern indigo snake could be expected to occur adjacent to the project area.

Red-cockaded Woodpecker (RCW)

Three inactive, federally endangered RCW trees are located within the Alternative 1I project area, and multiple active RCW trees are present within 1 mile of the project area. Forest clearing adjacent to RCW foraging habitat would inhibit the expansion of foraging habitat in that direction. However, Eglin's NRS biologists indicate there is extremely low potential for any of these clusters to become active because the habitat is not suitable for future colonization (Gault, 2009). No good foraging habitat is available near the trees, with most of the surrounding habitat consisting of low-quality sand pine. Thus, land clearing and construction at the Alternative 1I site are not likely to adversely affect the RCW. Impacts on the RCW would not be significant.

Okaloosa Darter

Sedimentation and runoff associated with construction and tree clearing activities at the site have the potential to affect the federally threatened Okaloosa darters in the stream in the northern portion of the project area (Toms Creek). There is no standard guidance for vegetative buffers along Okaloosa darter streams; however, maintenance of at least a 100-foot buffer, but preferably 200 feet or more, would substantially reduce the potential for excess sedimentation and runoff to affect the stream and would provide good aquatic habitat protection (USFWS, 2001). Usage of erosion control measures such as silt fencing near Toms Creek would also reduce impacts. With implementation of the suggested mitigations in Section 4.13.4, land clearing, construction, and daily operations under Alternative 1I are not likely to adversely affect the federally listed Okaloosa darter. Impacts on the Okaloosa darter would not be significant.

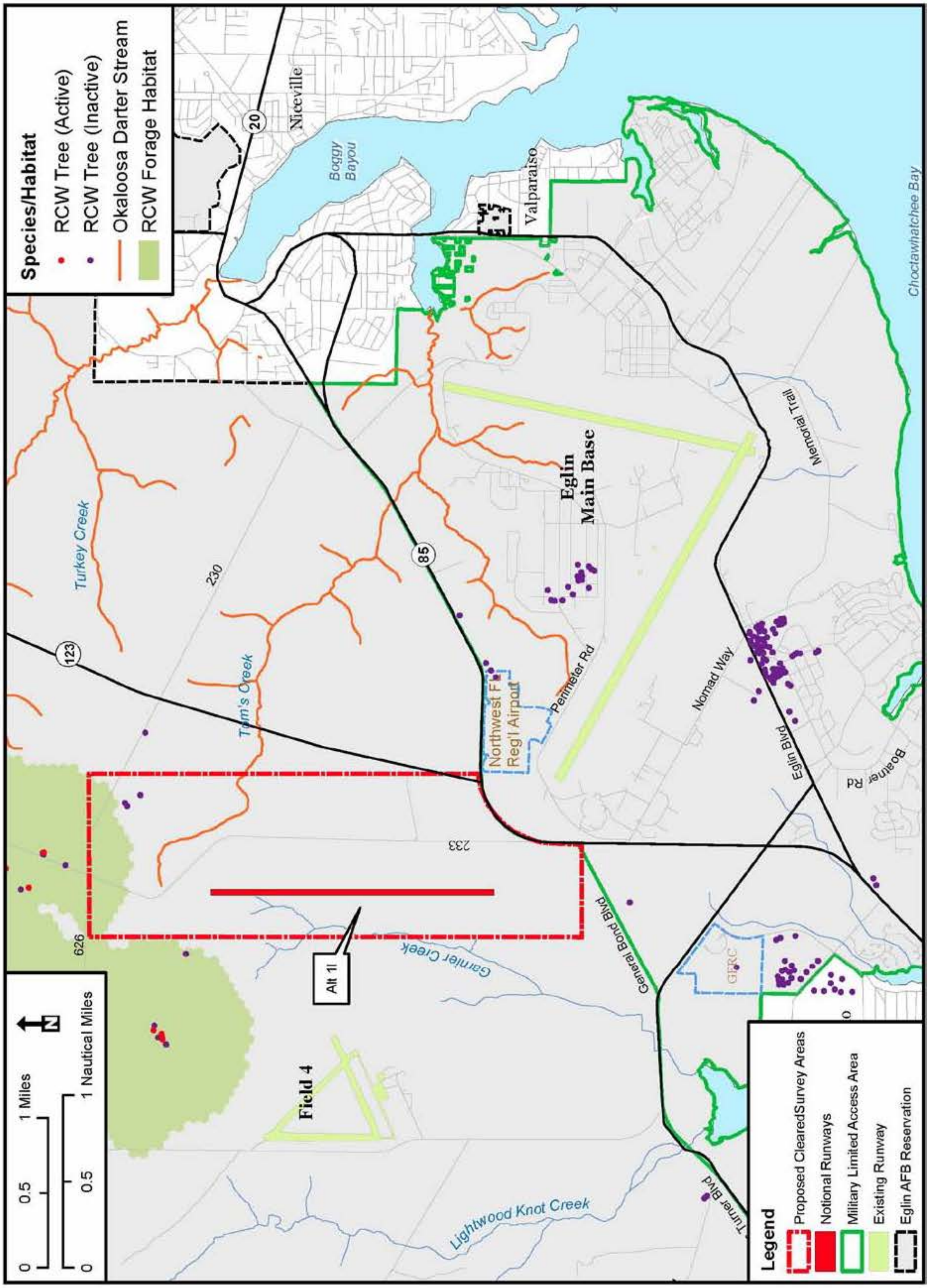


Figure 4-75. Sensitive Species Found on or Near the Alternative 1A (Preferred Alternative) and Alternative 1I Project Areas

Florida Black Bear

Surveys conducted in 2009 indicated several instances of black bear forage signs (Entrix, 2009). Habitat loss would be minimal, as the alternative location represents less than 1 percent of the total area of undeveloped lands on Eglin AFB, which provides black bear habitat throughout the Eglin Reservation. Possible impacts are associated with the potential for increased human–bear interaction. Several bear sightings have occurred to the south and east of the project area, along Hwy 85 and Hwy 123. Since 2003, there have been 34 reported bear mortalities from automobile collisions along Hwy 85 and 67 bears have been killed since 1984 by automobiles on roads that border Eglin property (Eglin Enterprise Spatial Database, 2010).

Increases in human activity in the area (food, garbage, etc.) could lead to increased interactions with bears. However, the fencing that would surround the flightline (preferably electric fencing) should prevent bears from entering the area, thereby reducing the likelihood of bears crossing Hwy 85 and Hwy 123 and related bear–automobile incidents. It is possible that bears may be attracted to the area due to smells despite the fact that they cannot access the cantonment area. As a precaution, it would be important for the flightline facility to responsibly handle waste, employing measures such as bear-proof dumpsters and bear-resistant garbage cans. Impacts on the Florida black bear would not be significant.

Gopher Tortoise

The Alternative 1I project area has the potential to provide habitat for the gopher tortoise; however, habitat quality is poor. During the 2009 surveys, only about 3 percent of the habitat within the project area was classified as "high quality." The project area consists predominantly of the Sandhills ecological association followed by landscaped/urban areas mainly in the southern portion where there are sprayfields, manmade stormwater ponds, and cleared vegetated areas. The Florida Fish and Wildlife Conservation Commission (FWC) (2008) characterizes good gopher tortoise habitat as having:

- The presence of well-drained, sandy soils, which allow for ease of burrowing.
- An abundance of herbaceous groundcover.
- A generally open canopy and sparse shrub cover, which allow sunlight to reach the forest floor.

Although some of the project area meets these criteria, in order to maintain good herbaceous groundcover and an open canopy, prescribed fire or heavy thinning of stands is required. Landers and Speake (1980) recommend judicious thinning of scrub oaks and prescribed burning at least every 5 to 10 years where summer burns are feasible or every 2 to 4 years if winter burns are used. Wilson et al. (1997) recommend a burn rotation of two to five years for sandhill habitat and one to three years for Flatwoods habitat. This area has not been burned within the last 20 years. Furthermore, because this parcel of land is adjacent to both urban areas and highways, the use of prescribed fire as a management tool in the future is unlikely.

Eglin GIS data have not historically shown gopher tortoises to inhabit this area. However, during the recent biological survey, one active burrow was located in the powerline clearing near Range Road 233 (Entrix, 2009).

Impacts could result from gopher tortoise burrow collapse or from direct physical impacts during construction. These impacts would be minimized through a survey of the area immediately prior to beginning construction to evaluate the presence of any gopher tortoise burrows and the subsequent relocation of tortoises identified during the survey. Transportation and release of tortoises would follow guidelines established by the FWC in *Gopher Tortoise Permitting Guidelines* (FWC, 2008).

Such relocations already occur on Eglin; since June 1993, well over 100 gopher tortoises have been relocated. The majority of these tortoises were moved to Eglin from off-site. However, tortoises have also been relocated from construction areas on Eglin and Hurlburt Field. Eglin currently has a number of release areas that have been approved by the FWC. Each site has been surveyed for the appropriate habitat and potential existing tortoise populations. The areas are all burned on a three- to five-year rotation in order to maintain suitable habitat.

Given the degraded condition of the Sandhills habitat in the Alternative 1I project area, it is unlikely any additional tortoises would be present. However, if any were found, relocation to another area on Eglin would alleviate impacts. Thus, impacts on the gopher tortoise would not be significant under any of the alternatives.

Eastern Indigo Snake

The federally threatened eastern indigo snake may be present; however, only one gopher tortoise burrow (which indigo snakes often use as refuges during the winter) is present in this area and habitat quality is generally poor. In coordination with the USFWS, as part of the eastern indigo snake recovery plan, Eglin has developed standard practices for forestry and other land-disturbing activities to minimize any potential impacts on this species. Such practices include providing project personnel with a description of the eastern indigo snake, its behaviors, and protection under federal law, and giving them instructions not to injure, harm, or kill this species. The primary potential impact would be crushing by vehicles, during both construction and daily operations. Practices that would reduce impacts include ceasing activities if an eastern indigo snake is sighted and allowing the snake to move away from the site before resuming activities, and avoiding disturbance of gopher tortoise burrows.

For any gopher tortoise burrows that were in imminent danger from clearing/ construction, Eglin would follow the *Gopher Tortoise Permitting Guidelines* (FWC, 2008) for relocation of gopher tortoises and commensals (e.g., indigo snake). In a best attempt to locate the commensals present in affected gopher tortoise burrows, video cameras would be used to look for commensals immediately prior to land-disturbing and construction activities, so that they could also be relocated. The recent surveys found no instances of indigo snake presence in the project area. The indigo snake is not likely to be adversely affected, and impacts on the indigo snake would not be significant under Alternative 1I.

Florida Pine Snake

In addition to the eastern indigo snake, the Florida pine snake and other commensal species also use gopher tortoise burrows as habitat. While the Florida pine snake has not been documented to occur in the project area, its occurrence is possible given the presence of gopher tortoises nearby and the ecological community types present in the project area. The primary potential impact would be crushing by vehicles during construction. Practices that would reduce impacts include ceasing activities if a Florida pine snake is sighted and allowing the snake to move away from the site before resuming construction activities.

For any gopher tortoise burrows that would require relocation, Eglin would follow the *Gopher Tortoise Permitting Guidelines* (FWC, 2008) for relocation of gopher tortoises and commensals (e.g., pine snake). In a best attempt to locate the commensals present in affected gopher tortoise burrows, video cameras would be used to look for commensals immediately prior to land-disturbing and construction activities, so that they could also be relocated.

The U.S. Army Corps of Engineers (USACE) describes good quality habitat for the pine snake as xeric, pine-dominated or pine–oak woodland with an open, low understory established on sandy soils. Nesting and hibernation sites require forest openings with level, sandy, well-drained soils and minimal shrub cover (USACE, 1998). The project area is primarily considered low-quality Sandhill habitat, given the requirements listed previously. It follows that the Florida pine snake occurs sparsely, given the low quality of the habitat.

Changes in species composition occur in Sandhills that do not experience frequent burning, resulting in increased shading and loss of the natural community over time.

The USACE finds that changes in fire regimes in these areas are likely the major factor leading to decline of southeastern subspecies of the pine snake (USACE, 1998). The project area cannot be fire maintained due to its proximity to developed areas and major highways, making it poor habitat for the pine snake.

While potential adverse impacts on individual snakes could occur if encountered during project activities, the impact on overall populations at Eglin would be minimal considering the following factors: (1) while loss of habitat due to development is one of the main contributors to species decline, Eglin has many thousands of acres that provide suitable habitat for the species and (2) subspecies of the pine snake in the southeast are intimately associated with habitat that has a history of frequent fires.

Given the poor quality of the Sandhills habitat in the Alternative 1I area, Florida pine snakes are not likely to occur there, making the likelihood of a vehicle encounter low. Impacts on the Florida pine snake would not be significant.

Invasive Nonnative Species

Disturbance of soils and vegetation from land clearing and construction could enhance conditions for the establishment and spread of invasive nonnative plant species. Because the majority of the expansion runway area would be covered by pavement or cleared landscaped areas, there would not be many areas with the proper environment for the establishment of invasive nonnative plants. Additionally, all landscaping and plantings of vegetation would conform to the Presidential Memorandum dated April 26, 1994, "Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds," and Executive Order (EO) 13112, *Invasive Species*, both of which require the planting of regional natives in landscaping. Mitigations are available to reduce the potential for invasive nonnative species infestations (see Section 4.13.4). Impacts of invasive nonnative plant species on biological resources would not be significant.

Flight Operations

Flight operations impacts on biological resources would differ only slightly from those discussed in the FEIS, Chapter 7, Section 7.12.1.2 and previously in this SEIS under Alternative 1A. Construction of the expansion runway in this location would expose active RCW trees to the north and northwest of the project area to increased noise levels. Likewise, noise would be increased on four active gopher tortoise burrows north of the proposed runway location. Noise is already a major component of the noise environment in this area, and although the intensity would be increased and some new areas affected, RCWs and other wildlife have thrived on Eglin AFB in areas characterized by aircraft noise. As has been observed previously, birds and wildlife would likely adapt to the gradual increase in noise levels. Suitable habitat often outweighs any negative effects from aircraft noise. As discussed under the No Action Alternative, impacts to domestic animals are not expected. The RCW is not likely to be adversely affected by Alternative 1I aircraft noise, and impacts on gopher tortoises and other biological resources would not be significant.

4.13.3 Alternative 2 – Duke Field

4.13.3.1 Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways

Construction

Flora and Fauna

The Sandhills ecological association is the largest ecological association found within the Alternatives 2A, 2B, and 2C project area, comprising approximately 95 percent, with smaller interspersed areas of open grassland/shrubland, wetland/riparian, and landscaped/urban areas present (Table 4-107, Figure 4-76**)**.

Table 4-107. Acreage of Ecological Associations Found Within the Alternative 2 Project Areas

Ecological Association	Alternatives 2A, 2B, and 2C		Alternatives 2D and 2E	
	Acres	Percent of ROI	Acres	Percent of ROI
Sandhills	3,584.3	95.58	642	95.54
Landscaped/Urban	85.4	2.28	30	4.46
Grasslands/Shrublands	30.8	0.82	N/A	N/A
Wetland/Riparian	49.5	1.32	N/A	N/A
Total	**3,750**	**100**	**672**	**100**

N/A = Not present within the project area; ROI = region of influence

Based on Eglin GIS data (Eglin GIS, 2009), no invasive species have been documented within the ROI.

Sensitive Habitats

The only sensitive habitats found within the Alternatives 2A, 2B, and 2C project area are HQNCs (Figure 4-77). One 7-acre area of upland hardwood forest HQNC is found within the northern portion of the project area, north of the proposed runway locations (Eglin GIS, 2009). Two Sandhill areas of HQNC, totaling 244 acres, are located in the southern portion of the project area, south of the proposed runway locations (Eglin GIS, 2009).

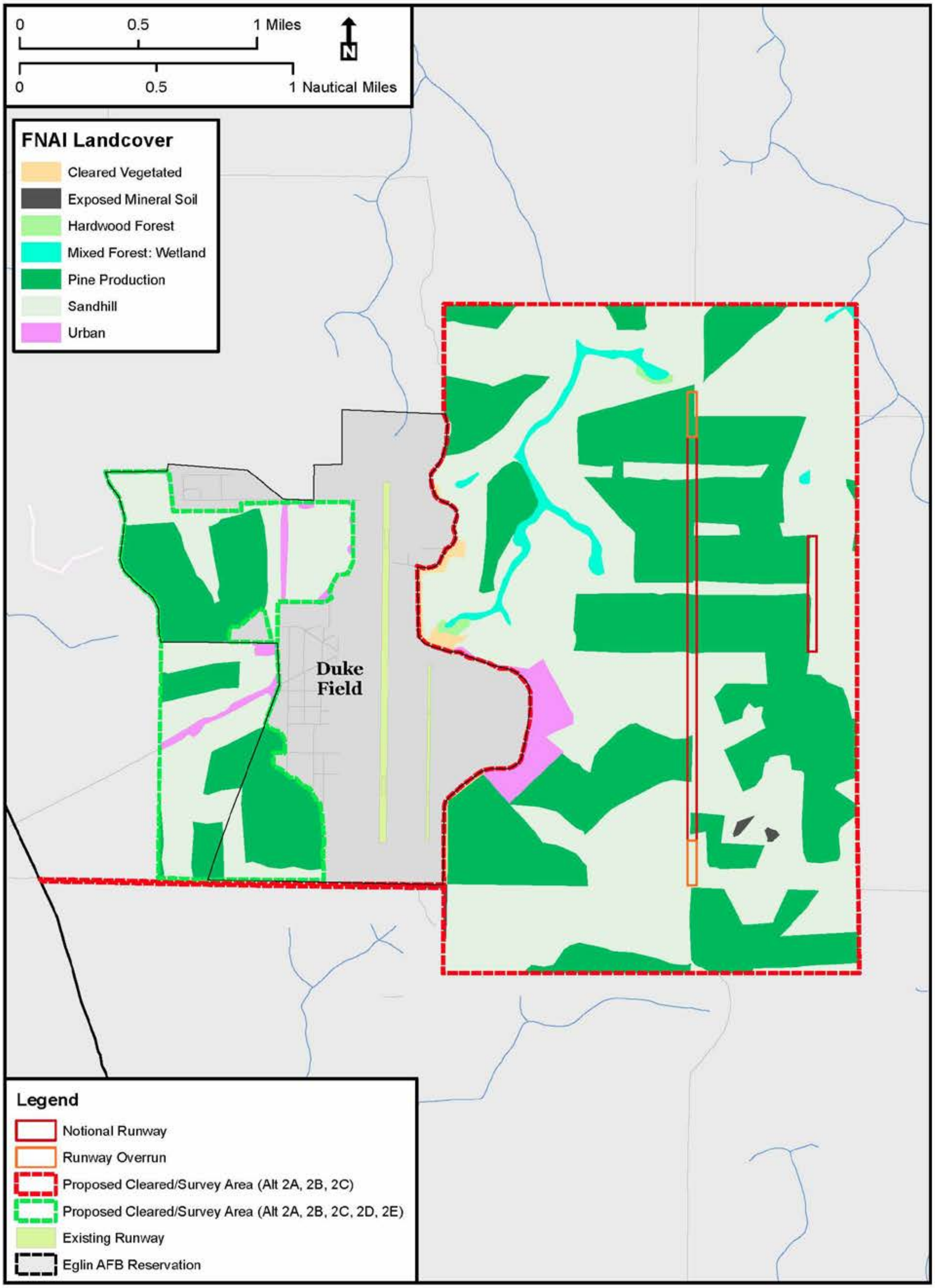


Figure 4-76. Ecological Associations Found on or Near the Alternative 2 Project Areas

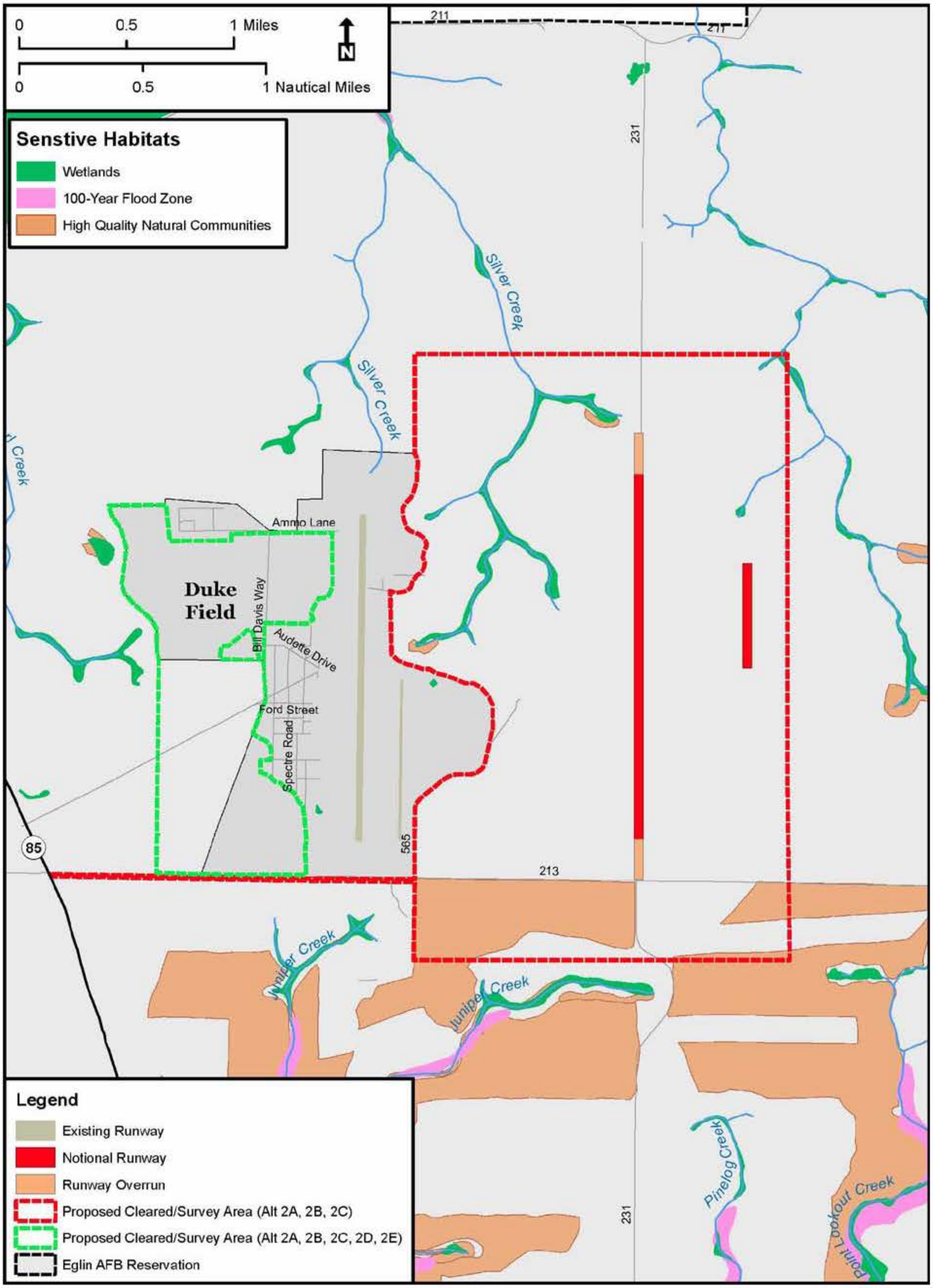


Figure 4-77. Sensitive Habitats Found on or Near the Alternative 2 Project Areas

The Spenser Flats Wetlands Outstanding Natural Area/Significant Botanical Site is located about 1 mile to the east of the proposed Alternatives 2A, 2B, and 2C site, and HQNCs exist in the southern portion of the site and along the headwaters of Silver Creek. The focus of management in HQNCs, Outstanding Natural Areas, and Significant Botanical Sites is the maintenance of natural processes (e.g., the fire regime), and abatement of specific threats, such as invasive species (e.g., sand pine and cogon grass). The ecological qualities of these areas require that management be carried out with a higher level of scrutiny, especially with regard to the high-quality herbaceous ground cover and the high density of rare species.

General management suggestions for each community type are presented in the Eglin AFB *Natural Community Survey Final Report* (Kindell et al., 1997). More-specific guidelines relating to each community's management are being developed by Eglin's NRS staff to be incorporated into pertinent component plans of the Eglin INRMP (U.S. Air Force, 2007).

Construction actions in any HQNC, Outstanding Natural Area, or Significant Botanical Site would be reviewed by appropriate personnel from each area of expertise within the NRS, and recommendations would be made on how to mitigate any potential impacts.

Development of the expansion runway, LHA deck, and associated support facilities and increased road traffic adjacent to a fire-dependent HQNC, Outstanding Natural Area, or Significant Botanical Site would make it much more difficult to maintain a regular prescribed fire rotation. The NRS would not likely be able to burn the area regularly or as thoroughly due to smoke management problems with the cantonment area and road (Furman, 2007). The NRS would prioritize prescribed fire as resources allow, however, the HQNC, Outstanding Natural Area, or Significant Botanical Site would likely be affected due to fire suppression (Furman, 2007), primarily from changes in vegetation due to lack of fire.

Only small areas of HQNCs, Outstanding Natural Areas, and Significant Botanical Sites would be directly affected by the construction of an expansion runway under Alternatives 2A, 2B, or 2C. These alternatives would involve clearing up to 251 acres of HQNCs. A reduction in prescribed fire would occur in the proximity of all Alternative 2 sites and in the areas along the access roads. Although there would be a reduction in acreage and degradation of certain sensitive habitats, similar habitats exist on other portions of Eglin and would continue to be maintained. Overall, impacts on these sensitive habitats would not be significant for any of the Alternative 2 locations.

Sensitive Species

Sensitive species documented to occur within the project area for Alternatives 2A, 2B, and 2C include the gopher tortoise, the RCW, and several state-listed plant species (Table 4-108, Figure 4-78, Eglin GIS, 2009). Okaloosa darter streams are located within 1 mile from the southern and western edges of the project location area. Due to the habitat type, the eastern indigo snake, Florida black bear, Florida pine snake, and Southeastern American kestrel may utilize the area.

Gopher Tortoise

There are 22 active gopher tortoise burrows that have been identified on the Alternatives 2A, 2B, and 2C sites (Entrix, 2009). Gopher tortoise burrows serve as important habitat for many species, including the federally threatened eastern indigo snake. Gopher tortoise burrows are easily damaged by ground disturbance, especially from heavy equipment, as they can cave in due to ground instability. Road improvements would create barriers and/or potential hazards from vehicles due to increased traffic volume and speed. Because gopher tortoises may occur within these sites, there is a potential impact through incidental contact. Therefore, gopher tortoise surveys would be conducted immediately prior to construction and road widening. If any burrows were found to be in imminent danger from construction or road widening, Eglin would relocate these tortoises in accordance with FWC guidelines (FWC, 2008).

Table 4-108. Sensitive Species Within or Adjacent to the Alternative 2 Project Areas

Scientific Name	Common Name	Status	Alternative
Birds			
Picoides borealis	Red-cockaded woodpecker	FE, SSC, MBTA	2A, 2B, 2C, 2D, 2E
Falco sparverius paulus	Southeastern American kestrel	ST, MBTA	2A, 2B, 2C, 2D, 2E
Reptiles			
Drymarchon corais couperi	Eastern indigo snake	FT, ST	2A, 2B, 2C, 2D, 2E
Gopherus polyphemus	Gopher tortoise	ST	2A, 2B, 2C, 2D, 2E
Pituophis melanoleucus	Florida pine snake	SSC	2A, 2B, 2C, 2D, 2E
Mammals			
Ursus americanus floridanus	Florida black bear	ST	2A, 2B, 2C, 2D, 2E
Plants			
Sarracenia rubra	Sweet Pitcherplant	ST	2A, 2B, 2C
Quercus arkansana	Arkansas Oak	ST	2A, 2B, 2C, 2D, 2E
Carex baltzelli	Baltzell's Sedge	ST	2A, 2B, 2C
Baptisia calycosa var *villosa*	Pineland Wild Indigo	LT	2A, 2B, 2C, 2D, 2E
Magnolia ashei	Ashe's Magnolia	SE	2A, 2B, 2C, 2D, 2E
Lupinus westianus	Gulf Coast Lupine	ST	2A, 2B, 2C, 2D, 2E
Pinguicula primuliflora	Primrose-flowered butterwort	SE	2A, 2B, 2C
Tephrosia mohrii	Pineland hoary-pea	ST	2A, 2B, 2C, 2D, 2E
Andropogon arctatus	Pine-woods bluestem	ST	2A, 2B, 2C, 2D, 2E

Source: Eglin GIS, 2009
FE = federally endangered; FT = federally threatened; MBTA = species protected under the Migratory Bird Treaty Act; SE = state endangered; ST = state threatened; SSC = state species of special concern

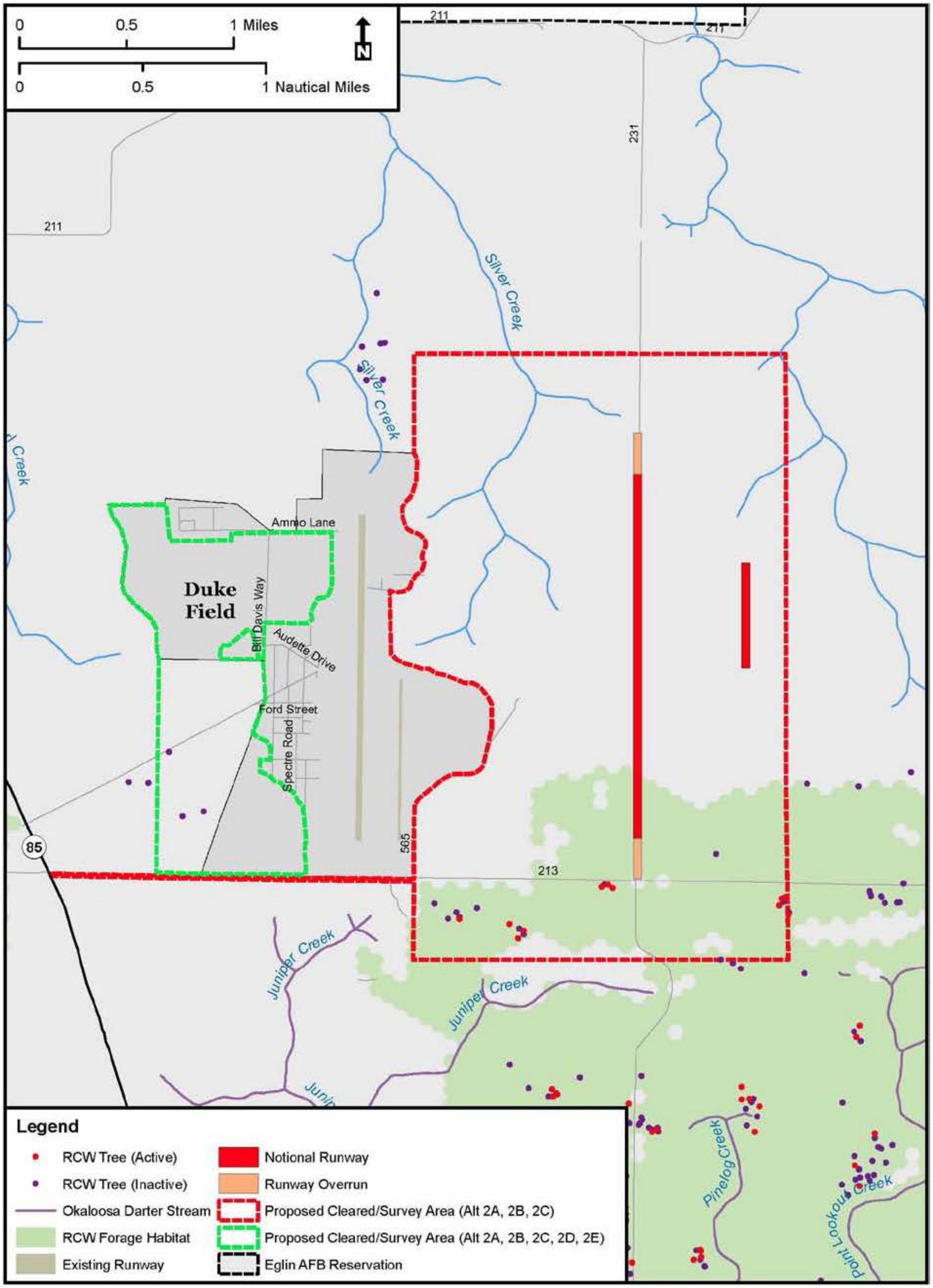


Figure 4-78. Sensitive Species Found on or Near the Alternative 2 Project Areas

In the event that a gopher tortoise was spotted after the relocation, actions that would minimize impacts on the gopher tortoise would include ceasing activity (including driving) if a gopher tortoise were spotted and waiting until the animal moved away from the area. Indirect impacts from the development of the Alternative 2 sites would include a reduction in future gopher tortoise habitat, and a degradation of surrounding habitats due to fire suppression. However, ample gopher tortoise habitat is available on other portions of Eglin, and any gopher tortoises within the construction footprint would be relocated to high-quality habitat at another location on Eglin. Overall impacts on the gopher tortoise would not be significant for any of the Alternative 2 locations.

Eastern Indigo Snake

The primary potential impact on the federally threatened eastern indigo snake is from direct physical impacts associated with land-clearing activities and increased traffic speed and volume on access roads. Incidental contact with personnel on foot and wheeled vehicles could result in trampling or crushing of individuals on roads, but this occurrence is unlikely, as a snake would most likely move away from the area if it sensed a general disturbance in its vicinity. However, if an indigo snake were sighted, impacts could be avoided if personnel ceased activities until the snake had moved away from the area.

Eglin has completed a programmatic Section 7 ESA consultation with the USFWS addressing the potential of finding an eastern indigo snake, relocating it to an appropriate area, and the assignment of take associated with such an action, thus providing ESA compliance should an eastern indigo snake need to be relocated. For any gopher tortoise burrows that need to be relocated, Eglin would relocate these tortoises and any associated commensals (i.e., indigo snake) in accordance with FWC guidelines in *Gopher Tortoise Permitting Guidelines* (FWC, 2008). In a best attempt to locate the commensals present in affected gopher tortoise burrows, video cameras would be used to look for commensals immediately prior to land-disturbing and construction activities, so that they could also be relocated. Thus, the Alternative 2 activities are not likely to adversely affect the eastern indigo snake. Overall impacts on the indigo snake would not be significant for any of the Alternative 2 locations.

Florida Pine Snake

While the state-listed Florida pine snake has not been documented to occur at any of the project areas, its occurrence is possible given the presence of gopher tortoise burrows and the Sandhills habitat of the project areas. Eglin would relocate tortoises and any associated commensals (e.g., pine snake) in accordance with FWC guidelines in *Gopher Tortoise Permitting Guidelines* (FWC, 2008). In a best attempt to locate the commensals present in affected gopher tortoise burrows, video cameras would be used to look for commensals immediately prior to land-disturbing and construction activities, so that they could also be relocated.

Direct physical impacts are also possible due to land-clearing activities and increased traffic speed and volume on access roads. Incidental contact with personnel on foot and wheeled vehicles could result in trampling or crushing of individuals on roads, but this occurrence is unlikely, as a snake would most likely move away from the area if it sensed a general disturbance in its vicinity. However, if a pine snake were sighted, impacts could be avoided if personnel ceased activities until the snake had moved away from the area.

While potential adverse impacts on individual snakes could occur if encountered during project activities, the impacts on overall populations at Eglin would not be significant considering that Eglin has many thousands of acres that provide suitable habitat for the species.

Flatwoods Salamander

There are no areas of potential flatwoods salamander habitat located within the project area. The nearest potential flatwoods salamander area is located approximately 1.5 miles to the east of the northern portion of the project area in the Spencer Flats Wetlands (Figure 4-78).

Construction of the expansion runway and LHA deck near potential flatwoods salamander habitat could make it more difficult to conduct prescribed burns, thus resulting in hardwood encroachment in the ephemeral wetlands where salamanders breed. Reductions in prescribed fire would also likely result in increased frequency of wildfires and associated soil-disturbing fire suppression activities. Although the project area is over 1.5 miles from potential flatwoods salamander habitat, the ability of the NRS to conduct prescribed burns in the area may be limited. By coordinating with JSF personnel, it may be possible to conduct enough burns in the area to continue salamander habitat maintenance. Due to concerns with chemical contamination, hydroperiod alteration, and excess sedimentation, chemical and mechanical means of understory control are not preferred and would only be used under the close supervision of wildlife biologists with the NRS.

The distance of potential habitat from the project area, lack of high-quality habitat, NRS coordination, and erosion control measures associated with the clearing and construction are all factors that would minimize the potential for impacts on the flatwoods salamander. Alternative 2 is not likely to adversely affect the flatwoods salamander, and impacts would not be significant under any of the alternatives.

Florida Black Bear

Impacts on the Florida black bear from habitat loss due to the development of an expansion runway and support facilities near Duke Field would be minimal, as it represents less than 1 percent of the total area of undeveloped lands on Eglin AFB, which provide black bear habitat throughout the Eglin Reservation. Potential impacts would be associated with the possible increased human–bear interaction, with increased vehicular traffic on access roads of primary concern. In the event that personnel saw a black bear, impacts could be avoided if activities ceased until the bear moved away from the area.

Bears may be attracted to the support facility area due to the presence of food waste. As a precaution, it would be important for the facilities to responsibly handle waste, employing measures such as bear-proof dumpsters and bear-resistant garbage cans. Additionally, Eglin could provide informational materials regarding bears and how to successfully coexist in bear country to JSF personnel. Impacts on the Florida black bear would not be significant at any of the Alternative 2 locations.

Red-Cockaded Woodpecker (RCW)

There are approximately 768 acres of RCW foraging habitat, 5 active RCW trees, and 22 inactive RCW trees located within the Alternative 2A, 2B, and 2C project area (Eglin GIS, 2009). The activities described under these alternatives have the potential to impact RCWs. Potential impacts are divided into construction and daily operations and habitat impacts. Impacts analysis focus on the habitat impacts associated with these alternatives and potential impacts on the RCW.

RCW Analysis – Construction and Daily Ground Operations

Land clearing, large machinery operation, and construction may disturb individuals or populations. Foraging RCWs may avoid areas where construction is occurring. Pioneering RCWs may be affected by noise from daily operations and not colonize or immigrate to new areas near the new runway site. This could affect the growth of the RCW population around the proposed runway area. Loud noises during nesting season (April–July) may affect RCW reproduction. Certain range roads in proximity to RCW foraging habitat would have an increased amount of traffic both during construction and daily operations, potentially creating noise levels that would affect RCWs.

Suitable habitat appears to outweigh any negative influences associated with noise due to construction or aircraft noise. Observations have indicated that many animals become adapted to human activities and noises (Busnel and Fletcher, 1978). Scientists who have researched the effects of noise on wildlife report that animals may initially react with a startled effect to noises, but adapt over time, so that even this behavior is eradicated (Busnel and Fletcher, 1978). Based on the fact that the RCW population continues to grow at Eglin, including areas in close proximity to test areas, it appears that they have adapted to all of the noises associated with the military mission, including those as loud as supersonic booms. Therefore, noise from construction and daily operations associated with the new runway is not likely to adversely affect the RCW, and impacts would not be significant. However, due to the overall potential for impacts on federally listed species, Eglin's NRS conducted an ESA Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*).

Habitat Impacts

Habitat impacts include loss, alteration, and/or degradation of habitat. These impacts characterize the physical damage, stress, or disruptions that may adversely alter or degrade the habitats essential to the sustainment of a species. A habitat in this instance refers to the ecological and geomorphological components, such as vegetation, soil, topography, and water that support a species. Alternatives 2A, 2B, and 2C may cause sensitive habitat destruction or degradation resulting from human activities (e.g., construction, tree clearing).

One essential element of RCW management is the allocation of foraging habitat to individual groups. Long-term success requires a thorough knowledge of the species' foraging requirements. Partitions around clusters serve to help provide the suitable quantity and quality of foraging habitat. Some potentially harmful activities may occur within the partition as long as 121 acres of good quality habitat remains (Convery and Walters, 2004). Home ranges vary dramatically among and within populations and can complicate analyses. Recently, habitat quality has been found to be more important than distance from the cluster (Convery and Walters, 2004). This phenomenon was exaggerated when higher quality habitat existed at or beyond the periphery of the partition but not in proximity to the cavity tree cluster.

The percentage of the RCW protected home range increases as a function of partition radius. However, larger partitions may not be better because they may not necessarily include good habitat. A tradeoff exists between partition size and function, because RCWs are a central-place foraging species (i.e., they regularly return to the cavity tree cluster), and preferentially select habitat near the cavity tree cluster (Rosenberg and McKelvey, 1999). This makes habitat near the cluster center more valuable than habitat farther away. Furthermore, the percentage of better quality habitat decreases as a function of partition radius. Using larger partitions may result in restriction on use of land that is in reality unsuitable or poorer quality habitat (Convery and Walters, 2004). Groups often extend their home range in the direction away from neighbors and unsuitable habitat. Furthermore, Convery and Walters (2004) suggest land managers should limit the size and scope of practices that decrease foraging habitat quality within the partition and especially within the vicinity of the cluster area.

Foraging Habitat Analyses

The memorandum, *Implementation Procedures for Use of Foraging Habitat Guidelines and Analysis of Project Impacts under the Red-cockaded Woodpecker (Picoides borealis) Recovery Plan: Second Revision*, provides implementation guidance for use of the foraging habitat standards presented in the RCW recovery plan (Department of the Interior [DOI], 2005). The foraging habitat analysis presented below followed these procedures, along with the specific guidelines for the habitat conditions and foraging requirements for RCWs on Eglin under Alternative 2A.

<u>Foraging Partition Analysis</u>: Partition analysis involves using the model results from the foraging habitat assessment tool to determine what quantity and quality of foraging habitat exists pre-project and what would remain post-project. The foraging habitat model ranks habitat from 0 to 3, with 3 being the highest quality. This analysis would determine whether partitions affected by the project would meet the managed stability standard, recovery standard, or be somewhere in between, post-project.

Model results show that three entire clusters (200B, 200V, and 200H) would be removed, with a total of 782 acres of foraging habitat lost for these three clusters (Figure 4-79). Of the 782 acres, approximately 60 percent is considered optimal habitat, 24 percent is marginal habitat, and 16 percent is low-quality habitat. Clusters 200B, 200V, and 200H would be completely removed as well as the majority of the modeled foraging habitat for each cluster. Due to the large amount of habitat that would be cleared and the loss of active cavity trees, the RCWs within these clusters would be relocated by Eglin's NRS personnel prior to land clearing. Relocation involves capturing the birds and immediately transferring them to another site with suitable foraging habitat. Although relocation success is very low (near 0 percent) (Gault, 2009), there is a possibility that some birds would survive the relocation process.

As the tree clearing would remove the active trees within the three clusters, there was no need to calculate whether the remaining acres met Eglin's Recovery Standard or Managed Stability Standard. Other clusters (200D, 200P, 200N, 200W) with foraging resources to the south would remain after the tree clearing takes place and would not be affected. All tree removal would be coordinated with Eglin's NRS, and relocations would be conducted only by qualified NRS personnel.

Based on the foraging partition analysis, the proposed tree clearing may affect the RCW and would likely adversely affect the species; however, impacts on the RCW would not be significant. Due to the overall potential for impacts on federally listed species, Eglin's NRS conducted an ESA Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*). A group-level analysis is warranted.

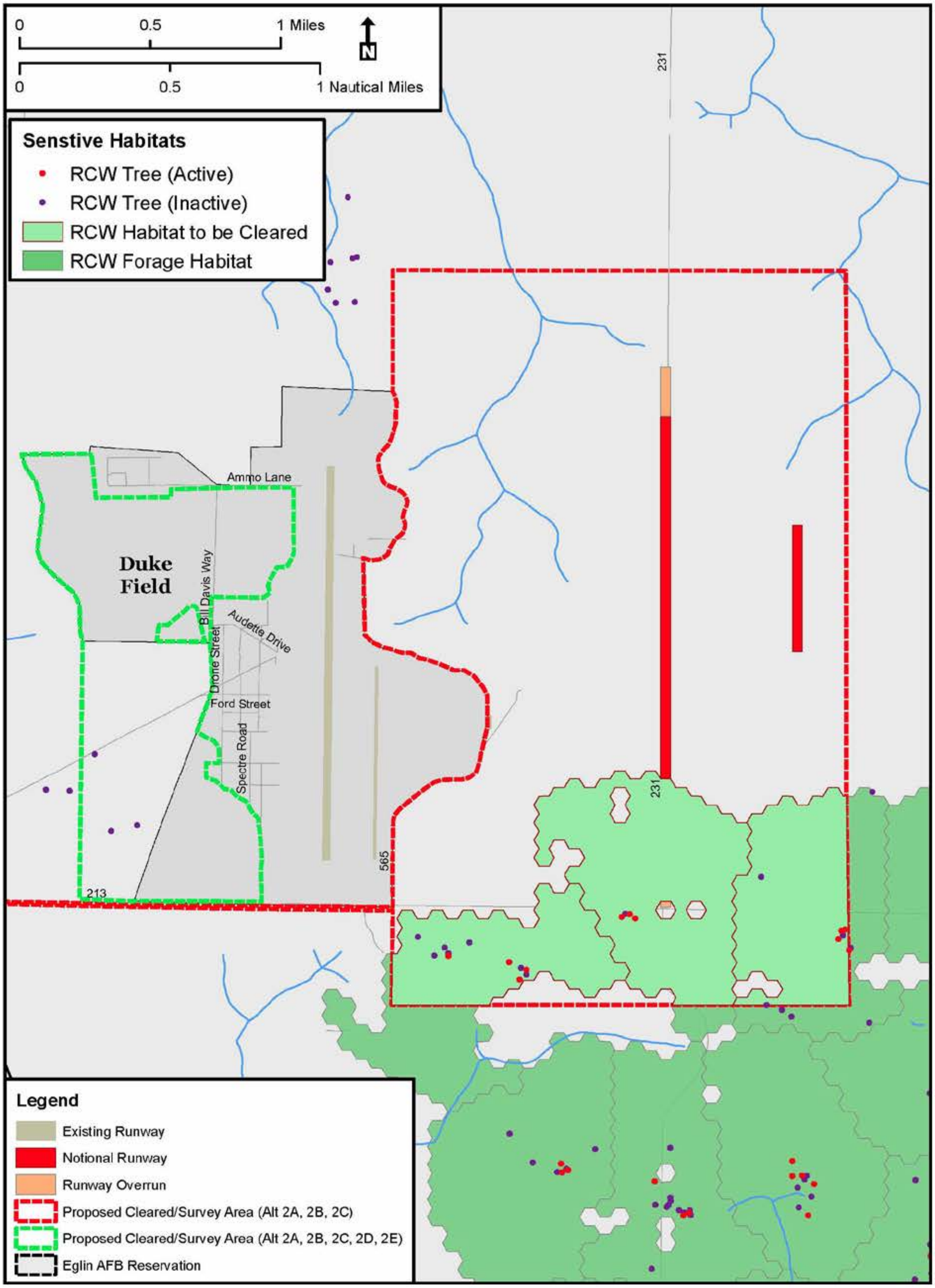


Figure 4-79. Detailed Foraging Habitat Model Results
(U.S. Air Force, 2009f)

Group-Level Analysis: Group-level analysis involves examining a project's impact on the demographic health of a group. The term "demographic" as used in the group-level analysis relates to the dynamic balance of a population, especially with regard to density and capacity for expansion or decline. Demographic health is related, in part, to quality and quantity of foraging habitat. Researchers continue to improve the understanding of relationships between RCW group fitness (e.g., reproductive success, group size, adult survival) and habitat quality (Engstrom and Sanders, 1997; Hardesty et al., 1997; James et al., 2001; Walters et al., 2002). The structure of foraging habitat is important to fitness and influences habitat selection. RCW fitness and habitat selection increases when foraging habitat is burned regularly, has an open character and herbaceous groundcover, and contains large old pines (DOI, 2005). Additionally, as habitat quality increases, the amount of foraging habitat used (i.e., home-range size) decreases.

In addition to habitat quality and quantity, group demographic health is also related to the configuration of suitable habitat, which influences the degree of group isolation. Isolation affects group fitness (i.e., size and reproductive potential). Published literature on group demographic health as it relates to population density and size is not extensive. However, several references (Conner and Rudolph, 1991; Hooper and Lennartz, 1995; and Beyer et al., 1996) are available to help determine the density of groups necessary to maintain demographic health (i.e., avoid isolation) of individual groups. Without sufficient numbers of dispersing birds to fill breeding vacancies or become helpers, group size and reproductive potential can be reduced.

Similar to the foraging partition analysis, a total loss of three clusters would affect the group negatively. Under this alternative, a total loss of birds in clusters and total habitat fragmentation negates a group level of analysis for the clusters taken. The clusters to the south of the proposed areas under Alternative 2A would not be affected due to any group isolation or habitat fragmentation.

The proposed tree clearing under Alternative 2A may affect the RCW and *would likely adversely affect* the species at the group level; however, impacts on the RCW would not be significant. Due to the overall potential for impacts on federally listed species, Eglin's NRS conducted an ESA Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*). A neighborhood-level analysis is required.

Neighborhood-Level Analysis: Neighborhood groups are those groups not directly affected by the project, but that occur adjacent to, or within the dispersal distance of groups that are directly affected by the project. By adversely affecting quantity and quality of foraging habitat, and thereby, the survival or stability of individual groups (e.g., by disruption of dispersal opportunities), projects may affect the health and distribution of RCW groups on a larger scale, the neighborhood.

Habitat quality associated with the neighboring clusters is good. The area is frequently burned with low-intensity prescribed fires, has a good grass and herbaceous plant cover, and a low hardwood midstory component. However, runway operations would negatively affect the ability of the NRS to burn RCW habitat south of the runway; a decrease in the fire return interval would result in RCW foraging habitat degradation (Hiers, 2010). The proposed activities would result in a reduction of foraging habitat and active trees. Neighboring clusters to the south of the clusters that would be removed would not be directly affected due to the distance to the nearest clusters and low potential to disrupt dispersal at their current location. The proposed project area under Alternative 2A is adjacent to Duke Field, located on the northwestern boundary of the eastern RCW population on Eglin, and optimal habitat to the south. Even though there would be direct loss of birds due to mortality or loss of active cavity trees, neighboring groups should not be affected directly; however, by removing all foraging habitat to the north of clusters 200D, 200P, 200N, and 200W, the long-term dispersal opportunities for these clusters is negatively affected.

At the neighborhood level, the proposed tree clearing may affect the RCW and would likely adversely affect the species because group demography of the neighboring clusters may be affected by limited growth potential for RCWs to the north, group loss, habitat fragmentation, and habitat acreage taken; however, impacts on the RCW would not be significant. Due to the overall potential for impacts on federally listed species, Eglin's NRS conducted an ESA Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*).

Population-Level Analysis and Recovery-Unit-Level Analysis: This level of analysis is warranted due to the scope of the project, which would *likely adversely affect* determinations for the group-level analysis and neighborhood analysis. The loss of 782 acres of foraging habitat and three clusters would not appreciably reduce the likelihood of the recovery unit being able to meet its population goal. Even if the affected clusters are removed and tree clearing is conducted, it would not impact the population as a whole. Eglin is currently implementing an active recruitment cluster program to grow the population in order to ensure that the potential loss of a few clusters would have no impact.

At the population level and recovery unit level, the proposed tree clearing is not likely to adversely affect the RCW, and impacts on the RCW would not be significant. Due to the overall potential for impacts on federally listed species, Eglin's NRS conducted an ESA Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*).

Conclusion of Foraging Habitat Analyses for RCW

The construction and daily ground operations associated with Alternative 2A may affect and would *likely adversely affect* RCWs. The clearing of 782 acres of active RCW foraging habitat may affect, and would *likely adversely affect* RCW habitat (Table 4-109, Figure 4-79). The USFWS species recovery plan for the RCW established 350 potential breeding groups as the population goal for Eglin (USFWS, 2003). As of August 6, 2009, a total of 371 potential breeding groups have been documented. This meets Eglin's recovery goal as established in the official species recovery plan (U.S. Air Force, 2006d). Eglin is currently working with the USFWS to amend the Threatened and Endangered (T&E) Species Component Plan to the INRMP and associated Biological Opinion to incorporate new management operations to continue with a mission flexibility goal of 450 potential breeding groups. Under Alternative 2A, even though three clusters would be completely removed, Eglin would not fall below the recovery standard for numbers of active clusters or potential breeding groups (Gault, 2009); therefore, the impacts would not be significant and would not impact recovery status or jeopardize the continued existence of the species. Eglin would continue growing the RCW population as defined by the INRMP goals and objectives, with a mission flexibility goal of 450 potential breeding groups (U.S. Air Force, 2006d).

Table 4-109. Results for Foraging Habitat Analysis

Foraging Habitat Analysis	ESA Section 7 consultation determination	Reasons
Foraging Partition Analysis	Likely to adversely affect	Active trees removed
Group-Level Analysis	Likely to adversely affect	Active trees removed
Neighborhood-Level Analysis	Likely to adversely affect	Decrease in neighboring birds' long term dispersal opportunities
Population-Level Analysis and Recovery-Unit-Level Analysis	Not likely to adversely affect	Does not appreciably reduce the likelihood of the recovery unit meeting its population goal

ESA = Endangered Species Act

All construction personnel would be briefed on potential endangered species concerns before tree-clearing activities in endangered species habitat; contract clauses would require coordination with an Eglin NRS endangered species biologist. Eglin's NRS conducted an ESA Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*). Prior to commencement of activities, Eglin will implement the modifications and conditions resulting from consultation with the USFWS (Table 2-19).

Southeastern American Kestrel

Kestrels could be affected by noise and human presence associated with Alternative 2 land clearing, construction, and daily operations. Kestrels typically nest in cavities excavated by woodpeckers in snags (dead trees). They most frequently use decayed longleaf pine trees greater than 9 inches (22.5 centimeters) in diameter and 2 feet (6.7 meters) tall (Florida Natural Areas Inventory [FNAI], 2006). Kestrels frequently locate their nests in the abandoned longleaf pine nest cavities of the RCW. Inactive RCW trees would be screened immediately prior to cutting to ensure no protected species were currently nesting there. Although there are 5 active and 22 inactive or abandoned RCW trees located in the project area, any kestrels present would likely move to a nearby area with suitable habitat, which is abundant on Eglin. Thus, overall impacts on the Southeastern American kestrel would not be significant for any of the Alternative 2 locations.

Invasive Nonnative Species

Disturbance of soils and vegetation from land clearing and construction could enhance conditions for the establishment and spread of invasive nonnative plant species. However, because the majority of the project area would be covered by buildings, pavement, or landscaped areas, there would not be many areas with the proper environment for the establishment of invasive nonnative plants. Additionally, all landscaping and plantings of vegetation would conform to the Presidential Memorandum dated April 26, 1994, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds*, and EO 13112, *Invasive Species*, both of which require the planting of regional natives in landscaping. Impacts from invasive nonnative plant species on biological resources would not be significant.

Flight Operations

Impacts of JSF air operations under Alternative 2A would be the same as those described for the No Action Alternative, except noise impacts at Duke Field and Choctaw Field would be greater, and noise impacts at Eglin Main Base would be decreased. Under Alternative 2B, impacts would be the same as those for Alternative 2A, except noise impacts at Eglin Main Base would be greater, and noise impacts at Choctaw Field would be decreased. Similarly, impacts under Alternative 2C would be almost the same as those described for Alternative 2A, except noise impacts would be increased slightly at Eglin Main Base. As discussed under the No Action Alternative, impacts to domestic animals are not expected under any of these alternatives.

However, none of these increases significantly impact any sensitive species. Impacts on biological resources from JSF air operations would not be significant under any of these alternatives. Air operations associated with Alternatives 2A, 2B, and 2C are not likely to adversely affect the RCW. However, due to the overall potential for impacts on federally listed species, Eglin's NRS conducted an ESA Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*).

4.13.3.2 *Alternatives 2D and 2E – Duke Field Single Runway*

Construction

This section discusses potential impacts on biological resources located within and adjacent to the action area. Analysis focuses on assessing the potential for impacts on biological resources from land clearing and construction and on identifying methods to reduce the potential for negative impacts on biological resources from these activities.

Flora and Fauna

Under Alternatives 2D and 2E, the proposed cleared/survey area east of Duke Field would not be included; only the western portion of Duke Field would be cleared. This area, totaling approximately 672 acres, is approximately 95 percent composed of Sandhills and urban/landscaped areas (Figure 4-76). The nearest Okaloosa darter stream is approximately 1,000 feet south of the project area, and there is sufficient vegetative buffer in the area between, so it is not likely that the stream would be affected adversely.

Based on Eglin GIS data (Eglin GIS, 2009) no invasive species have been documented within the ROI.

Sensitive Habitats

Construction of support facilities at Duke Field and increased road traffic adjacent to fire-dependent HQNCs to the south of Duke Field and west of Hwy 85 would make it much more difficult to maintain a regular prescribed-fire rotation. Eglin's NRS would not likely be able to burn the area regularly or as thoroughly due to smoke management problems.

No HQNCs, Outstanding Natural Areas, or Significant Botanical Sites would be directly affected by the construction of JSF support facilities under Alternative 2D or 2E (Figure 4-77). These alternatives would involve clearing 672 acres of land, 642 acres of which are Sandhills ecological association. The remaining construction area consists of land that is already classified as landscaped/urban. A reduction in prescribed fire would likely occur in the proximity of the Alternative 2D and 2E project site and in the areas along the access roads. Therefore, there could be a reduction in acreage or degradation of the sensitive habitats adjacent to the project area. However, similar habitats exist on other portions of Eglin and would continue to be maintained. Overall, impacts on these sensitive habitats would not be significant for the Alternative 2D and 2E location.

Sensitive Species

Sensitive species documented to occur within the project area for Alternatives 2D and 2E are similar to those discussed for Alternatives 2A, 2B, and 2C. Sensitive species include the gopher tortoise, the RCW, and several state-listed plant species (Figure 4-78, Eglin GIS, 2009). Due to the habitat type, the eastern indigo snake, Florida black bear, Florida pine snake, and Southeastern American kestrel may use the area.

Gopher Tortoise

Three active gopher tortoise burrows are located within the Alternative 2D and 2E project area. Because gopher tortoises may occur within the proposed areas, there is potential for gopher tortoise burrows to be damaged by ground disturbance or for impact through incidental contact. Therefore, gopher tortoise surveys would be conducted immediately prior to construction and road improvements. If any burrows were found to be in imminent danger from construction activities, Eglin would relocate these tortoises in accordance with FWC guidelines (FWC, 2008).

If a gopher tortoise were spotted after the relocation, operations that may impact the tortoise would cease until the animal moved away from the area. Development of the Sandhills habitat west of Duke Field would reduce future gopher tortoise habitat and surrounding habitats may be degraded due to fire suppression. However, abundant gopher tortoise habitat is available on other portions of Eglin and any gopher tortoises within the construction footprint would be relocated to high-quality habitat at another location on Eglin. Overall impacts on the gopher tortoise would not be significant under Alternative 2D or 2E.

Eastern Indigo Snake

There is potential to affect the eastern indigo snake through direct physical impacts associated with land clearing and construction, increased traffic speed and volume on access roads, and through incidental contact with personnel or vehicles. Snakes are likely to avoid the areas where construction is taking place or human activity is increased in general. However, if an indigo snake were sighted, impacts could be avoided if personnel ceased activities until the snake had moved away from the area.

For any gopher tortoise burrows that need to be relocated, Eglin would relocate these tortoises and any associated commensals (i.e., indigo snake) in accordance with FWC guidelines in *Gopher Tortoise Permitting Guidelines* (FWC, 2008). Video cameras would be used to look for commensals immediately prior to land-disturbing and construction activities, so that they could also be relocated. The Programmatic Section 7 consultation for indigo snakes provides ESA compliance should an eastern indigo snake need to be relocated. Thus, the Alternative 2D and 2E activities are not likely to adversely affect the eastern indigo snake. Overall impacts on the indigo snake would not be significant under Alternative 2D or 2E.

Florida Pine Snake

Direct physical impacts on the Florida pine snake are also possible due to land-clearing activities, increased traffic speed and volume on access roads, and incidental contact with personnel or vehicles. Once again, this is unlikely, as a snake would most likely leave the area if it sensed a disturbance in its vicinity. However, if a pine snake were sighted, impacts could be avoided if personnel ceased activities until the snake had moved away from the area.

While the state-listed Florida pine snake has not been documented to occur in the project area, its occurrence is possible given the presence of gopher tortoise burrows and Sandhills habitat. Eglin would relocate any tortoises and any associated commensals (e.g., the Florida pine snake) in the construction area in accordance with FWC guidelines in *Gopher Tortoise Permitting Guidelines* (FWC, 2008). Video cameras would be used to look for commensals immediately prior to land-disturbing and construction activities so that they could also be relocated.

While potential adverse impacts on individual snakes could occur if encountered during project activities, the impacts on overall populations at Eglin would not be significant considering that Eglin has many thousands of acres that provide suitable habitat for the species.

Florida Black Bear

Impacts on the Florida black bear from habitat loss due to the construction activities under Alternatives 2D and 2E would be extremely minimal, as the project area consists of less than 1 percent of the total undeveloped lands on Eglin AFB, which provides black bear habitat throughout the Eglin Reservation. Potential impacts would be associated with the possible increased human–bear interaction, with increased vehicular traffic on access roads and Hwy 85 of primary concern. In the event that personnel saw a black bear, impacts could be avoided if activities ceased until the bear moved away from the area.

Bears may be attracted to the support facility area due to the presence of food waste. As a precaution, it would be important for the facilities to responsibly handle waste, employing measures such as bear-proof dumpsters and bear-resistant garbage cans. Additionally, Eglin could provide informational materials regarding bears and how to successfully coexist in bear country to JSF personnel. Impacts on the Florida black bear would not be significant under Alternative 2D or 2E.

Red-Cockaded Woodpecker (RCW)

Four inactive RCW trees are located within the Alternative 2D and 2E project area; however, there is no RCW foraging habitat or active RCW trees within the project area boundary (Figure 4-77, Eglin GIS, 2009). Potential impacts on RCWs are discussed in greater detail earlier in this section with respect to Alternatives 2A, 2B, and 2C. Because the construction area for Alternatives 2D and 2E is a portion of the project area included in that analysis, that discussion can be referenced for additional information.

The proposed project area to be cleared/developed under Alternatives 2D and 2E on the west side of Duke Field covers 642 acres of Sandhills ecological association and 30 acres of developed/urban land. Tree clearing would involve the removal of four inactive RCW trees, and would involve removing tree cover in the vicinity of two additional inactive RCW trees. There is no RCW foraging habitat within the project area or in the immediate vicinity. The nearest RCW foraging habitat areas are approximately 0.5 mile to the west of the project area and 0.5 mile east of the project area.

Alternative 2D could result in the degradation of adjacent HQNCs due to fire suppression, but many acres of similar habitat would continue to be maintained on other portions of Eglin. Even though development of the area west of Duke Field under Alternative 2D would limit prescribed fire, the habitat near the site is already in poor condition and not considered good RCW foraging habitat. Based on the fact that the nearest active RCW cluster is over a mile away from the proposed site, the poor quality of the habitat within the site, and the availability of suitable habit elsewhere, construction and daily activities are not likely to adversely affect the RCW at this site.

Southeastern American Kestrel

Kestrels could be affected by noise and human presence associated with Alternative 2D and 2E land clearing, construction, and daily operations. Kestrels typically nest in woodpecker cavities in mature snags, often abandoned RCW cavities. Although there are four inactive RCW trees located in the project area, any kestrels present would likely move to a nearby area with suitable habitat, which is abundant on Eglin. Thus, overall impacts on the Southeastern American kestrel would not be significant for Alternative 2D or 2E.

Invasive Nonnative Species

Land clearing and construction has the potential to facilitate the spread of invasive nonnative plant species. However, because the majority of the project area would be covered by buildings, pavement, or landscaped areas, there would not be many areas with the proper environment for the establishment of invasive nonnative plants. Additionally, all landscaping and plantings of vegetation would conform to the Presidential Memorandum dated April 26, 1994, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds*, and EO 13112, *Invasive Species*, both of which require the planting of regional natives in landscaping. Impacts from invasive nonnative plant species on biological resources would not be significant.

Flight Operations

Impacts of JSF air operations would be the same as those described for the Alternative 2A, except noise impacts at Duke Field would be decreased, and noise impacts at Eglin Main Base and Choctaw Fields would be increased under Alternative 2D. Also, noise impacts at Duke would be compressed in the east–west direction and increased north and south under Alternative 2E. As discussed under the No Action Alternative, impacts to domestic animals are not expected under these alternatives.

However, these changes and increases do not significantly impact any sensitive species. Impacts on biological resources from JSF air operations would not be significant under either alternative. Air operations associated with Alternative 2D and 2E are not likely to adversely affect the RCW. Due to the overall potential for impacts on federally listed species, Eglin's NRS conducted an ESA Section 7 consultation with the USFWS for the FEIS, which resulted in the USFWS's issuance of a Biological Opinion (Appendix H, *Biological Resources*).

4.13.4 Mitigations

Construction

As stated in the FEIS, there are certain operating constraints based on current agreements with the USFWS for T&E species protection. Additionally, all terms and conditions resulting from the BRAC Section 7 consultation with the USFWS would be implemented. Below are potential additional mitigations to reduce or remove impacts on biological resources from JSF construction and daily activities:

- Immediately prior to clearing land, conduct surveys for gopher tortoises and indigo snakes. If any animals are found relocate them to another area on Eglin according to FWC guidelines.
- Provide project personnel with a description of the eastern indigo snake, including information on its behaviors, its protection under federal law, and instructions not to injure, harm, or kill this species.
- Direct personnel to cease any activities if a black bear, indigo snake, or gopher tortoise is sighted and allow the animal sufficient time to move away from the site on its own before resuming any activities. Immediately contact Eglin's NRS.
- Discourage human-bear interactions by responsibly handling waste and employing measures such as bear-proof dumpsters and bear-resistant garbage cans.

- Restrict vehicles to established roads and paved areas.
- Maintain at least a 100-foot vegetated buffer along Okaloosa darter and Florida bog frog streams.
- Utilize erosion control measures such as silt fencing near Okaloosa darter and Florida bog frog streams.
- To reduce potential seed sources, treat areas with known invasive nonnative species problems.
- To avoid spreading invasive nonnative species, do not drive vehicles in areas with known invasive nonnative species problems. If a vehicle is driven in such an infested area, clean the vehicle before it is driven to a noninfested area.
- Use only native plants for landscaping.
- Continue monitoring of RCWs in the area by Eglin's NRS.
- If tree clearing occurs during nesting season, screen each inactive cavity tree during the breeding season to verify that no trees have been recolonized.
- Continue prescribed burning as much as possible in RCW foraging habitat.

Flight Operations

The following potential mitigation would minimize impacts on sensitive species from air operations:

- Restrict low-level aircraft flights within 1,000 feet (vertically) of the eagle nest on Eglin Main Base during the breeding season (October 1 to May 15).

Munitions Use

The following potential mitigations would minimize impacts on sensitive habitats and species from munitions use:

- Develop wildfire operational plans with Eglin's NRS to identify high wildfire risk conditions and notification procedures that units would follow to engage fire response personnel when needed.
- Follow Eglin's Wildfire Specific Action Guide Restrictions (U.S. Air Force, 2006a).
- Maintain at least a 100-foot vegetated buffer along Okaloosa darter and Florida bog frog streams.
- Utilize erosion control measures such as silt fencing near Okaloosa darter and Florida bog frog streams.
- Minimize the placement of targets on sloped areas.

4.14 CULTURAL RESOURCES

Effects (i.e., impacts) on cultural resources are defined as "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the [National Register of Historic Places (NRHP)]" (36 CFR 800.16(i)). For the purposes of the environmental consequences section, impacts are presented as either adverse or not adverse. "An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR 800.5(a)(1)).

Any unanticipated discovery of cultural resources revealed during implementation of this undertaking after completion of National Historic Preservation Act (NHPA) Section 106 compliance, as reflected in the SEIS and its ROD, would be processed in accordance with the Unanticipated Discoveries section of the project-specific amended programmatic agreement provided in Appendix F, *Cultural Resources*.

4.14.1 Commonalities Across All Alternatives

All planning actions and, if necessary, mitigative actions related to the alternatives, are discussed under provisions of the amended project-specific programmatic agreement (presented in the section below and in Appendix F, *Cultural Resources*).

Under provisions of the amended programmatic agreement between Eglin AFB, the 7SFG(A), the JSF Program, and the Florida SHPO, the following stipulations are presented as an Assessment of Effects:

"(3)(a) Flight training will result in over-flights of NRHP eligible historic districts and individually eligible buildings and structures in proximity to Eglin Field. Current noise levels at Eglin Field range from 65 to 85 dB. Aircraft noise in excess of 85 dB is expected as a result of the BRAC undertaking affecting a larger area within Eglin Field than at present (see map of historic districts and individually eligible buildings at Eglin Field in relation to the projected noise contour zones in Appendix I [of the Programmatic Agreement]).

(3)(b) If increased aircraft noise will result in the abandonment of a building or structure that is either a contributing property to a historic district or is individually eligible, and use of the building is no longer viable thereby threatening loss of its physical integrity, then the undertaking will have an adverse effect."

Resulting from this Assessment of Effects, the following stipulation is presented as a Resolution to Adverse Effects:

> "(3)(a) If, as a result of increased aircraft noise, Eglin AFB proposes to abandon buildings or structures that either contribute to the NRHP eligibility of the SAC Alert Historic District, the Eglin Field Historic District, the Warehouse Historic District, or the Marine Operations Historic District, or any one of the individually eligible historic buildings or structures, then prior to abandonment, Eglin AFB shall consult with SHPO regarding treatment of adverse effect and may enter into a Memorandum of Agreement for that purpose."

For additional analysis of potential impacts on land use and management practices relating to noise resulting from flight operations, refer to Sections 4.3, *Noise,* and 4.4, *Land Use*.

For aerial bombing and gunnery effects on Eglin AFB discussed under the amended programmatic agreement, the stipulations for Assessment of Effects (C) and resolution of Adverse Effects (D) are as follows:

> "C(2) The use of air–to-ground ordnance will result in ground disturbance in areas that are known to contain NRHP eligible or potentially eligible archaeological sites. These actions will adversely affect the integrity of location and materials.

> (D)(2)(a) All archaeological sites that are either determined NRHP eligible or are potentially eligible to the NRHP shall, whenever possible, be avoided and preserved in place following the avoidance procedures in Stipulation III.E.1 (a) through (c).

> (D)(2)(b) To ensure that avoidance is achieved in a consistent and coordinated manner, Eglin AFB shall consult with JSF to determine which of the avoidance measures identified in Stipulation III.E.1 are best utilized to achieve avoidance. If some other measure better achieves avoidance for the purpose of JSF use of the bombing ranges, then Eglin AFB, in consultation with SHPO, shall utilize that measure. Eglin AFB shall provide JSF with copies of the maps identifying all avoided sites and buildings, submitted in a form useful to JSF, and will periodically update these maps as needed. A copy of the maps and any updates will also be provided to the SHPO with a description of the avoidance measures used for each historic property. Periodically, Eglin AFB shall brief appropriate JSF staff on the importance of protecting cultural resources, the sensitivity of cultural resources data, and the need to limit access to this data.

(c) If avoidance is not possible or desirable, Eglin AFB will, as needed, make a determination of NRHP eligibility in accordance with Stipulation III.C. Any NRHP eligible archaeological site or historic building or structure identified within the bombing ranges that cannot be protected through avoidance will be adversely affected by the undertaking. Eglin AFB shall coordinate with JSF and follow the procedures in Stipulation III.E.2 through III.E.4, as applicable, to resolve the adverse effects."

Under Section Amending Stipulation IV. D - Resolution of Adverse Effects:

"A. Historic Properties in Alternatives I A, II, 2A, 2B, 2C may be adversely affected should any of these alternatives be selected by the Air Force for the construction of new runways and ancillary facilities as further discussed below.

l. No archaeological sites or historic buildings/structures will be affected during construction if the Air Force selects Alternative 1A. Aircraft training operations are projected to increase noise levels in and around Eglin Main Base, however. Adverse effect to the two adjacent historic districts may occur if, because of increased noise levels, Eglin AFB decides to abandon any building that is a contributing property to the districts. Under this condition, Eglin AFB will follow the procedures established for Air Field operations under Stipulation IV.D.3 to treat any adverse effects to the districts resulting from increased noise levels.

2. Should Alternative Il attempt to avoid the site in accordance with Stipulation III.E.I, as applicable. If avoidance is not possible, Eglin AFB shall coordinate with JSF and follow the procedures in Stipulation III.E.2 through III.E.4, as applicable, to resolve the adverse effects. Should increased noise levels lead Eglin AFB to abandon any one of the individually eligible historic buildings within the APE, then Eglin AFB will follow Stipulation IV.D. 3 to treat any adverse effects to the buildings and structures.

3. If any one of Alternatives 2A, 2B or 2C is selected, Eglin AFB will attempt to avoid sites 8OK2485 and 8OK333 in accordance with Stipulation lll.E.l of the [BRAC Programmatic Agreement], as applicable. If avoidance is not possible, Eglin AFB shall coordinate with JSF and follow the procedures in Stipulation TJT. E.2 through III.E.4, as applicable, to resolve the adverse effects."

NOTE: After the amendment to the Programmatic Agreement was signed, site 8OK2485 was determined to be ineligible for listing on the NRHP.

Flight Operations

Previous studies have demonstrated that little probability exists that runway operations noise causes structural damage to buildings. In fact, several studies of the effects of noise on historic properties located in high aircraft-noise zones have found that vibration resulting from the activities of tour groups, and even vacuuming, generated more structural vibration than that generated by aircraft noise (National Research Council/National Academy of Sciences, 1977; National Aeronautics and Space Administration [NASA], 1976; NASA, 1978). Subsonic sound of less than 130 dB is highly unlikely to damage structural elements (Sutherland, 1990). Despite this, vibrations from flight operations may lead to increased rattling of structural elements, adding to annoyance factors for occupants.

Adverse effects from flight operations are not expected to occur on cultural resources under any alternative. In this section, all historic structures and historic districts that are listed or eligible to be listed on the NRHP that fall within the greater than 65 dB DNL noise contours presented in this SEIS are examined.

Choctaw Field is located at the western edge of the Eglin Military Complex. No historic structures, districts, or traditional cultural properties are present at Choctaw Field.

Duke Field is located within the north-central portion of the Eglin Military Complex. There are no historic districts, historic buildings, or traditional cultural properties within the Duke Field cantonment determined to be eligible for listing on the NRHP.

Eglin Field is located within the south-central portion of the Eglin Military Complex. Adjacent to the Eglin Main Field are two historic districts. The first district is Eglin Field, consisting of 22 contributing structures. The second is the Strategic Air Command (SAC) Alert Historic District. Fourteen buildings or structures are considered to be contributing members of this district. Three other historic districts are also located on Eglin Main Base but are not directly adjacent to Eglin Main Field. These include the Warehouse Historic District with 4 contributing structures, the A-22 Historic District with 11 contributing structures, and the Marine Operations Historic District with 2 buildings and a boat dock. Another district, Camp Pinchot, is located off of Eglin Main Base and consists of 20 contributing structures and 7 non-contributing structures.

Fourteen historic structures not associated with any of the historic districts are present in all alternatives' APE for flight operations (Table 4-110). These structures, considered eligible for nomination to the NRHP, are located within the proposed noise contours that are greater than 65 dB DNL. No structures considered eligible for the NRHP are located within the greater than 65 dB DNL noise contours off the Eglin AFB installation boundaries.

Table 4-110. Eligible Historic Structures (Non-Historic District) Within Greater Than 65 dB DNL Noise Contours on Eglin Main Base

Site Identification	Building Number	Name	Current Use	Temporal Association	Year Built
8OK01309	40	Survival Equipment Shop	Government Offices	World War II	1943
8OK01311	8	Exchange Administrative Office	Central Exchange Administration	World War II	1943
8OK01312	10	Administrative Office	Base Post Office	World War II	1943
8WL01502	123	Readiness Crew Quarters	Fighter Alert Crew Quarters	Cold War	1949
8OK1484	130	Aircraft Maintenance Hangar	King's Hangar	Cold War	1950
8OK1303	33	Warehouse	Civil Engineering Maintenance Shop	World War II	1943
8OK1304	34	Flight Simulator Training Facility	Disaster Preparedness Facility	World War II	1941
8OK1307	37	Headquarters Group Maintenance and Supply	Environmental Health Offices	World War II	1941
8OK1306	36	Aircraft Field Maintenance Shop	Environmental Health Offices	World War II	1941
8OK1305	35	Supply and Dayroom	Headquarters Squadron Offices	World War II	1941
8OK1310	44	Armament Instrument and Inspection	Telecommunications Facility	World War II	1943
8OK1334	68	Temporary Hangar 68	Aircraft Maintenance Hangar	World War II	1942
8OK1844	73	Astro-Inertial Laboratory	Missile Test Laboratory	Cold War	1962
8OK2084	954	Air Defense Command Type 2 Operations Building	Non-Air Force Administrative Office	Cold War	1955

Munitions

Bombing or strafing training would take place on TAs B-70, B-75, C-52, C-62, and C-72. Cultural resources would be adversely affected at all of those test areas, except for TA B-75. No NRHP-eligible cultural resources are on TA B-75. However, within 100 meters of TA B-75, two sites are considered potentially eligible for nomination to the NRHP. Two NRHP-eligible archaeological resources are located within 400 meters. Also, Metts Cemetery is approximately 30 meters outside the boundaries of the range. The cemetery is not considered an NRHP-eligible historic property. Because all these distances are well outside the safety buffer for TA B-75, it is highly unlikely that any of these properties would be affected by munitions usage. The TA B-75 landscape is considered to be too disturbed, with a low probability of intact cultural resources, and is not recommended for additional survey.

All areas eligible for survey within TA B-70 have been surveyed (Cultural Resources Information Management System [CRIMS], 2012). These surveyed areas are located primarily around the banks of Live Oak Creek and Bull Pond. A total of 17 archaeological sites are located within TA B-70, all of which have been determined as ineligible for the NRHP. Thirteen structures are listed as historic structures and buildings within TA B-70. One structure is considered eligible for the NRHP (building #8970). Building #8970 requires protection and maintenance in accordance with maintenance standards and guidelines as described in the Eglin AFB *Integrated Cultural Resources Management Plan* (ICRMP) (Eglin AFB, 2006) and the Programmatic Agreement between the Air Armament Center, the Florida State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (U.S. Air Force, 2003b). Stipulations for the resolution of adverse effects are also put forth in the amended project-specific programmatic agreement (presented previously in this Section 4.14.3 and Appendix F, *Cultural Resources*). The remaining 12 structures are considered ineligible to the NRHP. No historic districts, traditional cultural properties, or cemeteries are present within the test area (CRIMS, 2012).

Twenty-nine archaeological sites are located in TA C-52E. Of these 29 sites, 27 are considered ineligible for the NRHP. One site is under review to determine eligibility, and one is considered eligible for nomination to the NRHP (site 8WL1727). The Operation Crossbow historic district is located on the northern boundary of the test area. The northern portion of the test area requires additional survey.

The southern portion of TA C-62 requires additional survey. Within TA C-62, there are 11 known archaeological sites, all of which are considered are considered ineligible for listing on the NRHP and require no additional consideration.

TA C-72 has been completely surveyed for cultural resources (CRIMS, 2012). There are 22 archaeological sites located within TA C-72. All of these 22 sites are considered ineligible for the NRHP. Identified historic properties on TA C-72 include 8WL2237, the Range E historic district, TT-45 (Vietnam Tunnels and Shaft), TT-63 (Reinforced Concrete Subpen), and 9503 (Inclined Sled Track).

Tyndall AFB

Using a conservative operational level, noise modeling indicated that time-averaged noise levels (i.e., DNL) in the vicinity of Tyndall AFB would not noticeably exceed levels published in the *F-22 EA*. Consequently, no adverse effects to historic properties, traditional cultural properties, sacred sites, or native villages are expected to occur under existing MOAs, Air Traffic Control assigned airspaces (ATCAAs), or warning areas due to the proposed addition of F-35 operations associated with the JSF IJTS.

4.14.2 Alternative 1 – Eglin Main Base

4.14.2.1 *Alternative 1A – No Runway Changes at Eglin Plus Use of Duke Field and Choctaw Field (Preferred Alternative)*

Construction

No adverse effects to cultural resources would occur from construction under this alternative. No known historic properties are located within the area of potential effect (APE) for Alternative 1A. All high-probability areas have been surveyed for cultural resources. In addition, construction of hangars would occur on previously developed and paved ground, so no adverse effects to cultural resources are anticipated from this activity. Should archaeological deposits be discovered during construction, however, Eglin AFB will follow the provisions for unanticipated discoveries in provided for in the Eglin AFB *Integrated Cultural Resources Management Plan* (Eglin AFB, 2006) as well as stipulations of the amended project-specific programmatic agreement.

4.14.2.2 *Alternative 1I – One New Runway at Eglin Plus Use of Duke Field and Choctaw Field*

Construction

Adverse effects to cultural resources would occur from construction activities at Eglin Field under this alternative. Eight previous archaeological surveys were conducted within the 2,127.5-acre APE, completing survey of all high-probability areas within Alternative 1I. One NRHP-eligible historic homestead site (8OK2750) does fall within this APE and, therefore, has the potential to be impacted by Alternative 1I (CRIMS, 2012). 8OK2750 is an historic early twentieth century artifact scatter with associated structural remains (Callisto et al., 2010; CRIMS, 2012). Appendix F, *Cultural Resources*, lists historic properties and survey areas completed for each alternative.

4.14.3 Alternative 2 – Duke Field

Eleven previous surveys have been completed in the project area. Within the 3,750-acre Alternative 2 APE, all high-probability areas have been surveyed to identify whether cultural resources are present within the study area (CRIMS, 2012). One archaeological site considered eligible for listing on the NRHP (Site 8OK333, a Late Paleo/Early Archaic site) would be affected under Alternatives 2A, 2B, and 2C, but not 2D or 2E (CRIMS, 2012).

Potential impacts as a result of construction activities are described below.

4.14.3.1 *Alternatives 2A, 2B, and 2C – Duke Field Parallel Runways*

Construction

Adverse effects to cultural resources would occur from construction under this alternative. One archaeological site (8OK333) considered eligible for listing on the NRHP is present within the APE under Alternatives 2A, 2B, and 2C (CRIMS, 2012).

The Air Force will attempt to avoid site 8OK333 in accordance with Stipulation lll.E.l of the amended project-specific programmatic agreement, as applicable. If avoidance is not possible, Eglin AFB shall coordinate with JSF program personnel and follow the procedures in Stipulation TJT. E.2 through III.E.4, as applicable, to resolve the adverse effects.

4.14.3.2 *Alternatives 2D and 2E – Duke Field Single Runway*

Construction

No adverse effects to cultural resources are expected under Alternative 2D or 2E. All high-probability areas have been surveyed within this project parcel. No historic properties considered eligible for listing on the NRHP, traditional cultural properties, or cemeteries are located within this alternative area (CRIMS, 2012).

Should archaeological deposits be discovered during construction, however, Eglin AFB will follow the provisions for unanticipated discoveries provided for in the Eglin AFB *Integrated Cultural Resources Management Plan* (Eglin AFB, 2006) as well as stipulations of the amended project-specific programmatic agreement.

4.14.4 Mitigations

The Air Force would incorporate protection or mitigation measures provided through an amended NHPA Section 106 project-specific programmatic agreement (refer to Appendix F, *Cultural Resources*), which generally includes the following:

- Use highly visible avoidance measures, such as flagging, tree or vegetation planting, temporary fencing, removable barriers, signage or gating and permanent barriers around the recorded limits of cultural sites.
- Map the location of all archaeological sites and historic buildings and describe avoidance measures for each.
- Coordinate with user groups to communicate the importance of protecting cultural resources and how to identify and avoid impacting them. This includes

determining what markings, maps, briefings would be most effective to ensure avoidance of historic properties.

- Data recovery, architectural treatment, or alternative mitigation methods conducted by a qualified individual and coordinated with the SHPO.

The Air Force would incorporate protection or mitigation measures for historic structures provided through an amended NHPA Section 106 project-specific programmatic agreement (refer to Appendix F), which generally includes the following:

- Address anticipated adverse effects of demolition by updating appropriate forms, compiling electronic photos and blueprints, and communicating with the public.
- Accomplish all demolition using qualified individuals and coordinate directly with the SHPO.
- Avoid and preserve in-place, whenever possible, all archaeological sites that are either determined to be or potentially be eligible for listing on the NRHP, or follow the appropriate stipulations and procedures to resolve adverse effects.
- If, as a result of aircraft noise, Eglin proposes to change the use of buildings that contribute to or are NRHP-eligible structures, determine whether the structure serves its historic purpose and whether the use is important to its significance. If both criteria are met, consult with SHPO and possibly enter into a Memorandum of Agreement regarding treatment of adverse effect.

Under Section 3 of the amended programmatic agreement Amending Stipulation IV.B - Identification and Eligibility:

> "A. Eglin AFB has completed cultural resource inventories for all alternatives. Prehistoric and historic archaeological sites have been recorded in four project alternatives. Historic buildings and structures are present in or adjacent to two project alternatives. No historic properties of religious or cultural significance to the tribes are known or have been reported to Eglin AFB in the revised APE. In consultation with the SHPO, Eglin AFB has made, or is in the process of making, [NRHP] eligibility determinations for newly recorded archaeological sites.
>
> B. The results of the identification and eligibility are as follows.
>
> 1. Alternative I A: No [NRHP] eligible archaeological sites have been identified in the APE for this alternative. Two historic districts (Eglin Field and SAC Alert), composed of multiple historic buildings and structures, are located adjacent to the APE. Three additional historic districts (Warehouse, A-22 and Camp Pinchot) are

within the Eglin Main complex but not adjacent to the APE. See map of historic districts in relation to the APE in Appendix K 1.

2. Alternative II: Eglin AFB's Site Probability Model indicates that one potential historic homestead area may be present within the APE and will require investigation. Two archaeological sites have been identified: site 8OKl838, a prehistoric Late Paleo-Indian/Early Archaic site; and, site 8OK2417, a middle twentieth century historic military site.

Both sites, pending final determinations, are not eligible for listing in the [NRHP]. Fourteen historic buildings and structures, individually eligible for listing in the [NRHP], are within the APE for this alternative. See map of historic buildings in relation to the APE in Appendix K 2 [of the Programmatic Agreement].

3. Alternatives 2A, 2B, 2C, 2D, and 2E: Two archaeological sites have been identified in the APE for alternatives 2A, 2B, and 2C. Site 80K2485, a terminal Weeden Island Fort Walton component is pending an eligibility determination. Site 80K333, a Late Paleo/Early Archaic site, is [NRHP] eligible. No historic properties are located within Alternative 2D or 2E. See map of archaeological sites in relation to the APE in Appendix K 3 [of the Programmatic Agreement]."

After the amended programmatic agreement was signed in 2011, site 8OK2750 (the previously described homestead site) was determined to be *eligible* for the NRHP. Mitigation for this resource will require avoidance if possible or data recovery and/or other mitigation, as needed.

Also after the execution of the amended programmatic agreement in 2011, site 8OK2485 was evaluated as *ineligible* for the NRHP. Site 8OK333, a Late Paleo/Early Archaic site, is eligible for the NRHP and would require avoidance if possible or data recovery and/or other mitigation, as needed.

This page is intentionally blank.

5. CUMULATIVE EFFECTS AND OTHER ENVIRONMENTAL CONSIDERATIONS

5.1 CUMULATIVE EFFECTS

5.1.1 Introduction

According to Council on Environmental Quality (CEQ) regulations, the cumulative effects analysis of an environmental impact statement (EIS) should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 Code of Federal Regulations [CFR] 1508.7).

Cumulative effects may occur when there is a relationship between a proposed action or alternative and other actions expected to occur in a similar location or during a similar time period. This relationship may or may not be obvious. The effects may then be incremental and may result in cumulative impacts. Actions overlapping with or in close proximity to the Proposed Action or alternatives can reasonably be expected to have more potential for cumulative effects on "shared resources" than actions that may be geographically separated. Similarly, actions that coincide in the same timeframe tend to offer a higher potential for cumulative effects.

In this Supplemental EIS (SEIS), the Air Force has made an effort to identify actions on or near the action area that are under consideration and in the planning stage at this time. These actions are included in the cumulative effects analysis to the extent that details regarding such actions exist and the actions have a potential to interact with the Proposed Action or alternatives outlined in this SEIS. Although the level of detail available for those future actions varies, this approach provides the decision maker with the most current information to evaluate the consequences of the alternatives. The SEIS addresses cumulative impacts to assess the incremental contribution of the alternatives to impacts on affected resources from all factors.

The analysis first discusses past actions, events, and circumstances that are relevant to the environments associated with the Joint Strike Fighter (JSF) flight training alternatives. Following is a discussion of other actions that, when combined with the flight training actions and associated construction activities, may result in incremental impacts.

5.1.2 Relevant Past and Present Actions

For over 60 years, Eglin Air Force Base (AFB) has armed the U.S. military through the development and testing of conventional weapons. Eglin's primary function is to support research, development, test, and evaluation of conventional weapons and electronic systems. It also provides support for individual and joint training of operational units. Over 50 specific test areas and sites are located on the Eglin land ranges and water ranges in the Gulf of Mexico for specialized weapons testing (U.S. Air Force, 1996), the majority of which is air-to-ground testing. The approximately 130,000 square miles of airspace overlying the land and water ranges permits relatively unconstrained operations. Of the 1,057 square nautical miles (NM^2) of restricted airspace that exists from the surface to unlimited altitude east of the Mississippi River, Eglin is responsible for managing 705 NM^2. This represents a significant portion, 67 percent, of the scarce restricted airspace required for hazardous military testing and training for Department of Defense (DoD) units across the nation. Eglin contains the largest test range in the continental United States and the only supersonic range (Test Area B-70) east of the Mississippi River. The preservation of unique test areas and valuable restricted airspace managed by Eglin AFB are critical to the new generation of large footprint and long-range standoff weapons. The combination of extensive land and water ranges provides the necessary areas to contain large weapons footprints and long distances required for testing the new generation of weapons.

Areas that exist beyond and between the test areas are multi-use interstitial areas used primarily for safety buffers. These areas are also used for ground training when scheduling permits and for recreational purposes. Training at Eglin includes primarily the Air Force Special Operations Command (AFSOC), other Air Force units, some Army Rangers ground training, 7th Special Forces Group (Airborne) (7SFG(A)), the Army National Guard, Navy air-to-ground training, and the Navy Explosive Ordnance Disposal (EOD) school. Public recreation, including hunting, hiking, boating, and fishing, occurs on approximately 261,000 acres and is on a noninterference basis with military uses.

The relevant past and present actions associated with the impacts of the Proposed Action include continued use of the test and interstitial areas for military test and training, and continued use of the existing base development and operations, plus nearby development and infrastructure improvements such as roads, pipelines, and power transmission lines. Past and present actions in and around the action areas associated with these activities may have cumulative effects on the local environment.

5.1.3 Reasonably Foreseeable Future Actions

For the purposes of identifying reasonably foreseeable actions, there is a recognition that some projects are outside of the control of the Air Force and Eglin AFB. Some regional development projects have been identified that may contribute incrementally to impacts associated with Air Force alternatives addressed in the SEIS. Furthermore, projects that the Air Force considers of limited scope (e.g., building of a courthouse annex, improvements to roadways for pedestrians) are not considered cumulatively significant and, therefore, were not included in the impact analysis.

Developments of Regional Impacts (DRIs). Review of the 2010 West Florida Regional Planning Council (WFRPC) Annual Report shows that there are no DRIs that entered the review process during 2010 (WFRPC, 2010). Although there are currently no DRIs under review, the Knight Family Trust Property Development is undergoing the optional Sector Planning process in lieu of the DRI process (WFRPC, 2008). However, this development is located at the far east border of Walton County in Bay and Washington Counties (Northern Trust, 2008).

Destin-Fort Walton Beach Airport Construction Projects. The Destin-Fort Walton Beach Airport is planning many new construction projects over the next few years. Plans include constructing an Air Traffic Control tower; overlaying the runway with asphaltic concrete; apron expansion, which will provide roughly 12,000 additional square yards of pavement for aircraft parking; construction of a noise wall that would extend 1,730 linear feet along the fence line of the Airport's northwestern border, creating 105 additional paved parking spaces; and adding approximately 2,300 square yards of pavement adjacent to the existing parallel taxiway to be used as an engine run-up pad.

DeFuniak Springs Airport Projects. The DeFuniak Springs Airport is planning new projects over the next few years, which include aircraft parking apron tie downs; repairs and upgrades to existing fuel tanks and dispensing equipment; purchase of a fuel truck; installing additional surveillance and access control equipment at the three existing access gates on the airfield; site preparation for T-hangar and aircraft parking apron development; construction of aircraft apron and taxi lane access on the north side of Runway (RW) 9/27; construction of a 10-unit T-hangar aircraft storage building and access taxiways on the north side of RW 9/27; construction of approximately 1,700 feet of interior access road serving the North Terminal Area Complex; installation of automated weather equipment; relocation and installation of a new airport rotating beacon on the south side of the airport; installation of upgrade components on the AWOS-II; installation of a turf landing surface on RW 18/36; installation of an additional aircraft parking apron at the proposed North Terminal Complex; burying power lines and removing power poles in the approach and transitional surfaces on and near the airport; and repairs to the plumbing system and septic tank system serving the public terminal building.

Area Transportation Improvements. Currently, construction is underway to upgrade part of Florida Highway (Hwy) 85 from four to six lanes. This project affects the stretch of highway from General Bond Boulevard to Hwy 123 and its interchange at the Northwest Florida Regional Airport.

Flyover at Duke Field over Hwy 85. The entrance to the 7SFG(A) cantonment and Duke Field via 77th Special Forces Way/McWhorter Avenue is in the construction phases of upgrading it to a freeway grade interchange. When completed, this interchange, which is currently metered, will improve traffic flow and traffic access occurring from Hwy 85 at the existing Duke Field entrance. This project renovates and enhances a primary hurricane evacuation route for Eglin AFB and surrounding communities.

Paving Rattlesnake Road from Hwy 85 to Camp James Rudder. This project involves the paving of Range Road 211 (River Road) from the intersection of Range Road 211 (River Road) and Range Road 257 (Camp Road), to the intersection of Range Road 211 (River Road) and Hwy 85. This will provide a secondary access to Camp Rudder when test missions close the primary access road.

Hwy 123 Widening. Hwy 123 from Hwy 85 South to Hwy 85 North will be widened from two lanes to four lanes. The project scope includes widening Hwy 123 to four lanes, building a flyover on the north end of Hwy 123 at Hwy 85, and creating water retention ponds to facilitate stormwater runoff management. This project renovates and enhances a primary hurricane evacuation route for Eglin AFB and surrounding communities.

Hwy 87 Widening. Hwy 87 will be widened from two lanes to four lanes from the southern boundary of Eglin AFB to the Yellow River Bridge. In addition, improvements will be made to storm management sites along the right-of-way. The purposes of improving Hwy 87 from a two-lane facility to a four-lane facility include safety enhancements, a reduction in traffic congestion and an enhanced hurricane and emergency evacuation route.

Eglin Main Comprehensive Plan. Based on review of the Eglin and Duke Field Comprehensive Plan, there are 32 planned Military Construction (MILCON) projects (including facility construction and runway projects) planned beyond fiscal year (FY) 2011 at Eglin Main Base.

Hurlburt Field General Plan. The Hurlburt Field General Plan identifies more than 50 transportation and capital improvement projects (U.S. Air Force, 2009g) over the next five years. These projects include demolition and new construction of facilities and roadways on Hurlburt Field. Specific information on each project and the potential impacts associated with the General Plan can be found in the *Hurlburt Field General Plan* (U.S. Air Force, 2009g).

Aviation Foreign Internal Defense Moving from Hurlburt Field to Duke Field. AFSOC will relocate the Aviation Foreign Internal Defense (AvFID) mission, conducted by the 6th Special Operations Squadron (6 SOS), from Hurlburt Field to Duke Field on Eglin AFB. Duke Field is currently home to the 919th Special Operations Wing (919 SOW). The 919 SOW’s 711th Special Operations Squadron (711 SOS) currently operates nine MC-130Es. In addition, AFSOC intends to purchase 16 light fixed-wing aircraft in total, with four to support the AvFID mission.

AFSOC will stand up a new Special Operations Squadron with the beddown of 16 AvFID fixed-wing aircraft (AvFID FW) at Duke Field beginning in FY 2013 (9 for the active component and 7 for the reserve component). This is in conjunction with retiring the current fleet of 10 MC-130Es. The next five aircraft retire in FY 2013 followed by the last five in FY 2015. AFSOC AvFID operations are meant to assess, train, advise, and assist foreign aviation forces in air operations employment and sustainability. AvFID operations support theater combatant commanders across the range of military operations, primarily by facilitating the integration of allied aviation forces supporting multinational forces. The full details of the AvFID proposal are described in the *Final Environmental Assessment for Aviation Foreign Internal Defense Beddown (AvFID) at Duke Field, Eglin AFB, Florida*, dated July 2012 (U.S. Air Force, 2012a).

9th SOS Returning to Hurlburt Field. The 9th Special Operations Squadron (9 SOS) is moving from Eglin AFB to Hurlburt Field to consolidate all local C-130 operations. Eight MC-130-Ps and the 1 SOMXS also will move from Eglin AFB to Hurlburt Field. Hurlburt Field will gain 252 personnel. The mission of the 9 SOS involves aerial refueling of special operations helicopters and the insertion, extraction and resupply of special operations forces by airdrop or airland operations.

728th Air Control Squadron (728 ACS) Decommissioning at Eglin AFB. Budgetary reductions planned for in the FY 2013 federal budget include the reduction of 3,900 active duty airmen. Among the units affected is the 728 ACS stationed at Eglin AFB. This unit provides command and control of joint operations, conducts surveillance, and provides weapons control, battle management and theatre communications data links. Reductions in force comprise 372 airmen assigned to the 728 ACS.

Alabama Army National Guard (ALARNG). In the next two to five years, the ALARNG is proposing to relocate their support facilities from Test Area B-75 to the Duke Field area.

AFSOC Small Unmanned Aerial System (UAS) School at Choctaw Field. The Air Force allowed AFSOC to stand-up a temporary UAS Schoolhouse at Choctaw Field in the summer of 2009. This temporary beddown would become permanent in the future if the Air Force determines the AFSOC UAS operations can be completed in conjunction with proposed F-35 operations at Choctaw Field. If the UAS operations conflict with F-35 operations, then AFSOC would relocate their UAS Schoolhouse.

Military Housing Privatization Initiative (MHPI). The Air Force is currently in the process of privatizing all military family housing for both Eglin AFB and Hurlburt Field. This process involves the demolition and construction of more than 1,400 houses. These activities were analyzed in the *Final Environmental Impact Statement for the Military Housing Privatization Initiative (MHPI) at Eglin AFB and Hurlburt Field, Florida* (the "MHPI FEIS") (U.S. Air Force, 2011d) in accordance with National Environmental Policy Act (NEPA) requirements (42 United States Code 4321), the CEQ regulations (40 CFR 1500), and federal regulations for the Department of the Air Force environmental impact analysis process at 32 CFR 989. In a Record of Decision (ROD) signed on February 6, 2012, the Air Force decided to implement the MHPI action at Hurlburt Field and Eglin AFB by selecting the MHPI Alternative 4, Mix Alternative (MHPI FEIS Section 2.3.6) along with the project commonalities (MHPI FEIS Section 2.1).

Emerald Coast Resort. The Air Force has decided to enter into a long-term lease under the Enhanced Use Lease program for the construction and operation of a resort complex located at Eglin Test Site A-5 on Santa Rosa Island. The Emerald Coast Resort is being constructed to benefit active service members and their families, retirees, DoD employees and families, and the general public as a recreation resort and commercial complex. The resort complex will be a multi-floor facility and will include lodging, lobby area, conference areas, restaurants, bars, swimming pools, and light retail. A portion of the roof will be made available for Eglin AFB range instrumentation with dedicated offices for range personnel and equipment in order to maintain the Test Site A-5 mission. Potential impacts have been analyzed in an environmental assessment, and the Air Force signed the resulting Finding of No Significant Impact (FONSI) on September 11, 2009.

Emerald Coast Technology and Research Center (ECTRC) at the University of Florida Research and Engineering Education Facility (UF-REEF). The Air Force has decided to enter into a long-term lease under the Enhanced Use Lease program for the construction of the ECTRC. The ECTRC will be developed as a campus with military and private sector co-use of facilities and access to University of Florida resources. This ECTRC campus will create a synergistic environment benefiting current and future missions, research, and development at Eglin AFB and the surrounding communities. The ECTRC will be developed on 98.65 acres of an approximately 118-acre parcel of land. This selected site is located just west of the intersection of Lewis Turner Boulevard and Hwy 85 outside the west gate of Eglin AFB and adjacent to the existing UF-REEF. Potential impacts have been analyzed in an environmental assessment, and the Air Force signed the resulting FONSI on April 4, 2012.

F-18 Operations at Choctaw Field. The Navy is currently repairing Oceana Fentress Naval Auxiliary Landing Field in Virginia, and during this period some of the flight training has been shifted to Choctaw Field. Although specific details such as number of aircraft and operations are not known at this time, these operations are expected to occur four times this fiscal year and would be transient in nature and short-lived. The noise profile of the F-18 is similar to that of the F-35.

5.1.3.1 *Conceptual Actions or Proposals Not Considered Reasonably Foreseeable*

All basing actions, such as future weapon system changes (e.g., additions, subtractions, or mission design replacements), unit moves, increases in manpower of 35 or more persons, proposed to take place on Air Force real property must be approved via the

Air Force Strategic Basing process set out in Air Force Instruction (AFI) 10-503, *Strategic Basing*, dated 27 September 2010. All proposed basing actions involving Air Force units and mission support, as well as other military Services and agencies requesting basing support must follow the AFI 10-503 processes and procedures to be considered valid. Until an approved site survey and the environmental impact analysis process have been completed, no final basing decision can be approved under the applicable process. Further, until final approval for basing has been granted by the Air Force Strategic Basing Structure, no movement of equipment, force structure, or personnel onto an installation may proceed, and no irretrievable commitment of Air Force resources may occur.

Below are several conceptual actions or proposals that either have not begun or have not substantially completed the aforementioned strategic basing process. Because they are not ripe for decision-making, they are not considered to be reasonably foreseeable actions for purposes of this SEIS. Such conceptual actions or proposals include, but are not limited to:

- F-35 Mission/Model changes – The primary purpose of this SEIS is to analyze the beddown location, the operational alternatives, and feasible mitigations for the 59 F-35 PAA—24 Air Force CTOL, 20 Marine Corps STOVL, and 15 Navy CV aircraft controlled by the 33rd FW—authorized for delivery by the February 2009 ROD. Any deviation from the planned F-35 mission identified above would be considered a basing action and would require Air Force approval per guidance above.
- F-35 Foreign Military Sales (FMS) – Training support offered by the U.S. Services to FMS customers falls under separate and distinct contractual arrangements and international agreements. However, the operations associated with FMS training are the same as the operations associated with training of international partners described in this SEIS; foreign students will operate within the 59 F-35 PAA framework authorized by the February 2009 ROD and the total numbers of operations reflected in the operational tables and operational plans reflected in Section 1.2.6 of this SEIS.
- F-35 Test and Evaluation – The extent of any F-35 test and evaluation at Eglin AFB under this SEIS is impliedly limited to the number of F-35 allocated to Eglin, the concept and scope of operations, their impacts, and feasible mitigations analyzed in the draft and final published versions of this SEIS and approved in the Air Force ROD. Any increase in F-35 test and evaluation aircraft at Eglin above 59 F-35 PAA would be considered a basing action.
- Relocation of Air Force Special Operations Air Warfare Center (SOAWC) from Hurlburt Field to Duke Field.

5.1.4 Cumulative Effects Analysis

Cumulative effects are assessed for each of the resources analyzed in previous sections. For this analysis, the past, present, and future actions would be the sum of all the activities associated with the Proposed Action, the No Action Alternative, and the other actions described in this chapter.

Airspace

As indicated in Chapter 4 (Section 4.2), the JSF flight operations would impact air traffic controller workload and would contribute to increased congestion (air and ground delays) for military and civilian aircraft across the region. The JSF flight operations would contribute to an already congested airspace created by the continuing growth of other civilian and military aviation customers in the region.

Projects occurring at the civilian airports located in Destin and DeFuniak Springs are anticipated to result in increased use of these airfields by civilian aircraft. Therefore, the airspace use surrounding the Eglin Range Complex that is being used for training activities is anticipated to increase.

Noise

Under any of the JSF flight training action alternatives, time-averaged aircraft noise levels would increase to a level that may be considered by the public to be adverse. Cumulative impacts would occur wherever noise impacts from proposed JSF flight training activities would overlap with noise impacts resulting from other reasonably foreseeable actions planned to occur at Eglin AFB.

The majority of the relevant past and present actions considered as part of the cumulative impacts analysis process involve construction of a new facility or demolition of an existing facility. Construction noise is temporary, lasting only for the duration of the construction project, and is typically limited to normal working hours (7:00 AM to 5:00 PM). In many locations, noise levels generated by aircraft would be much higher than noise levels generated by construction, such that construction noise would not result in an increase in the overall noise level. However, construction noise would be noticeable to persons living and working nearby, particularly while aircraft operations are not underway, and may generate additional annoyance. Noise impacts associated with these projects are expected to be limited to the boundaries of Eglin AFB and would be insignificant both separately and cumulatively.

New facilities proposed to be constructed, as with the MHPI, may be exposed to high noise levels and/or minor structural vibrations due to aircraft overflight, construction activities, and training with live munitions. Where practicable, on-base structures should incorporate noise attenuation measures in accordance with the Air Force noise guidelines published in DoD Instruction 4165.57, *Air Installation Compatible Use Zones (AICUZ)*.

Implementation of some of the SEIS alternatives would expose parcels selected for development under the MHPI to noise levels greater than 65 decibels (dB) day-night average sound level (DNL) but less than 75 dB DNL (Figure 5-1 and Table 5-1).

Table 5-1. Noise in Proposed MHPI Eglin Main Alternative Areas Under Proposed SEIS Alternative 1A

Parcel	Acres	
	65–70 dB DNL	70–75 dB DNL
SEIS Alternative 1A		
Main Base Parcel 1	0	0
Main Base Parcel 9	178.86	32.64
Main Base Parcel 10	92.69	0
Main Base Parcel 11	0	0
Total	**271.55**	**32.64**

dB = decibels; DNL = day-night average sound level; MHPI = Military Housing Privatization Initiative; SEIS = Supplemental Environmental Impact Statement

The number of acres affected under each of the SEIS alternatives for the selected MHPI Alternative 4 Eglin Main parcels is shown in Table 5-2. The exact number of proposed residences affected by the elevated noise levels will be determined at a later date when the developer of the MHPI parcels makes specific plans for community layout.

Table 5-2. Acres of Military Housing Privatization Initiative (MHPI) Impacted by Noise Levels Greater Than 65 dB DNL Under SEIS Alternatives

BRAC SEIS Alternative	MHPI Parcel Acres				
	Parcel 1	Parcel 9	Parcel 10	Parcel 11	Total
No Action Alternative	0	211.50	92.17	0	303.67
Alternative 1A	0	211.50	92.69	0	304.19
Alternative 1I	0	211.50	94.33	0	305.83
Alternative 2A	0	147.02	0.35	0	147.37
Alternative 2B	0	209.58	30.14	0	239.72
Alternative 2C	0	205.24	12.60	0	217.84
Alternative 2D	0	188.97	4.00	0	192.97
Alternative 2E	0	147.02	0.35	0	147.37

BRAC = Base Realignment and Closure; dB = decibels; DNL = day-night average sound level; MHPI = Military Housing Privatization Initiative; SEIS = Supplemental Environmental Impact Statement

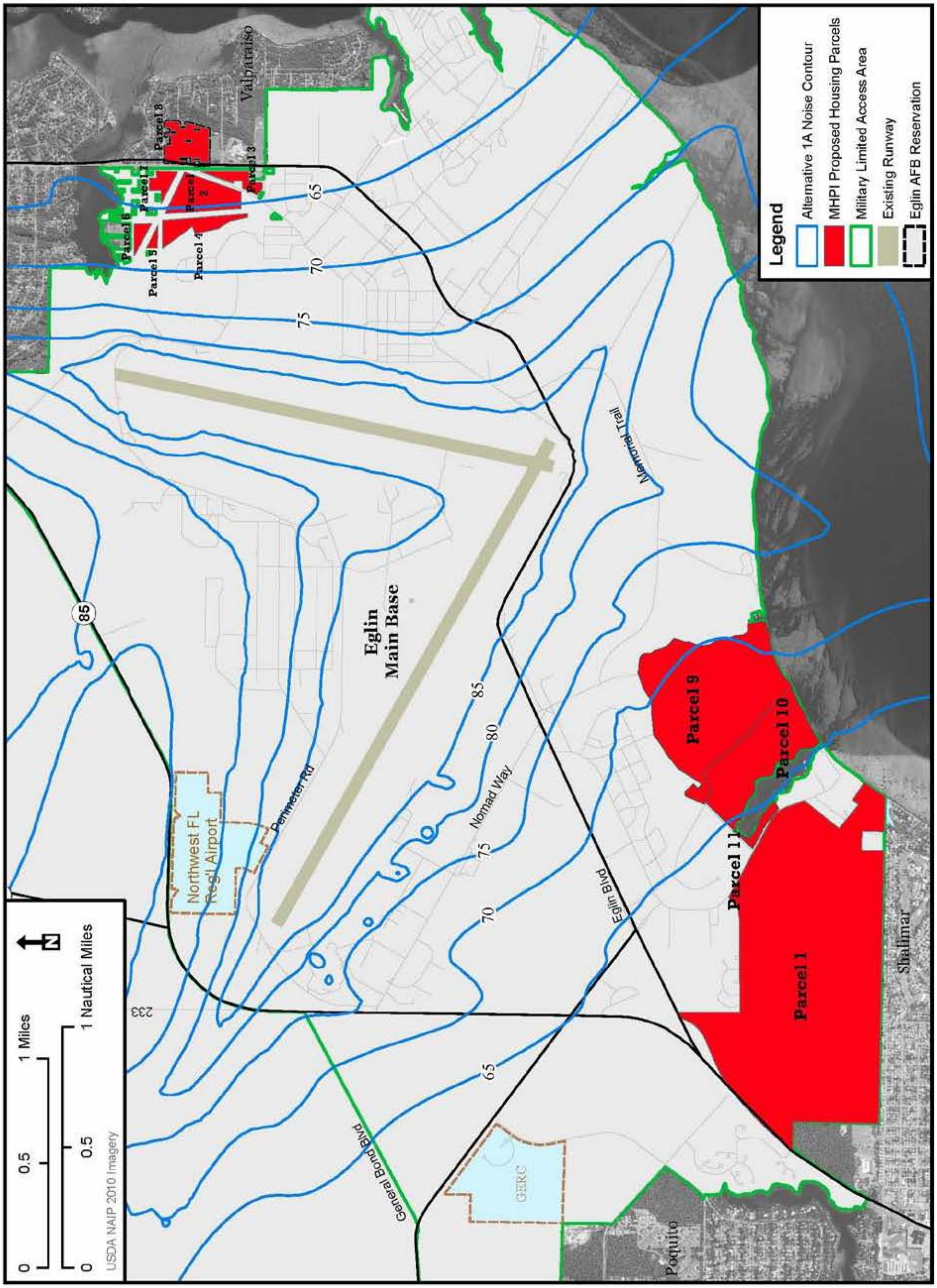


Figure 5-1. MHPI Eglin Main Alternative Parcels and Noise Contours Under Alternative 1A (Preferred Alternative)

The Air Force recommends against most residential land uses in areas exposed to noise levels greater than 65 dB DNL unless special noise attenuation measures are incorporated into the residences (Air Force Handbook 32-7084, *The AICUZ Program Manager's Guide*). In areas exposed to noise at 65–70 dB DNL, a 25 dB outdoor-to-indoor noise level reduction (NLR) is required in order for the residence to be considered compatible with noise. In areas exposed to noise at 70–75 dB DNL, a 30 dB NLR is required for the structure to be considered compatible. The Air Force will include in its MHPI request for qualifications a requirement that all residences be designed and constructed such that these outdoor-to-indoor NLRs are achieved. It should be noted that structural noise attenuation would not mitigate noise levels experienced while residents are outdoors.

Implementation of SEIS alternatives would be expected to result in additional annoyance among persons living in the MHPI areas due to increased noise levels. Typical populations can be expected to have a moderate to very severe negative reaction to noise at levels between 65 and 75 dB DNL (Committee on Hearing, Bioacoustics and Biomechanics [CHABA], 1977; DNWG, 2009). However, most of the persons living in the residences constructed under the MHPI would be either employed by the military or related to an employee of the military. As noise is a subjective experience, these persons would be expected to have a less negative reaction on average than persons not directly linked to the Armed Services. Noise attenuation measures incorporated into the residences would further reduce the impact of aircraft noise on the residents. No noise-related health impacts have been demonstrated to occur at noise levels less than 75 dB DNL (CHABA, 1977) and therefore, no such impacts would be expected under the selected MHPI areas.

Noise generated during MHPI construction would be additive to noise levels generated by aircraft operations. However, construction noise would be temporary, lasting only for the duration of the construction projects, and would be limited to normal working hours (7:00 AM to 5:00 PM). Noise generated during construction would be typical of residential construction sites, and would not be expected to result in effects other than moderate annoyance in persons living and working nearby.

Land Use

The Proposed Action should not have any cumulative land use impacts on the majority of the reasonably foreseeable cantonment area projects on Eglin AFB. The increase in noise exposure and its effect on land use compatibility could have a potentially adverse cumulative impact on the MHPI. Future NEPA studies associated with the MHPI program would need to consider the potential increase in noise exposures that could result from the Proposed Action. No cumulative land use impacts are anticipated for either Duke Field or Choctaw Field if they are used for JSF training activities.

Potential increases in noise exposures from the proposed JSF airfield and aircraft operations would have adverse impacts on existing off-base land uses, especially on residences located within affected areas. Depending on which alternative is selected, between 1,612 to 3,665 acres of off-base area could be exposed to noise levels of 65 dB DNL to 74 dB DNL and 97 to 286 off-base acres could be exposed to noise levels of 75 dB DNL or greater. The affected off-base properties include areas of land only.

Noise impacts on the surrounding communities would be greatest northeast of Eglin Main Base in Valparaiso and Niceville. Other impacted areas include unincorporated areas of Okaloosa County, part of Shalimar, and the area southeast of Crestview over the Shoal River. Depending on the alternative, between 18 to 92 acres of residential land located primarily in the Valparaiso and Niceville areas could be exposed to noise levels that exceed 75 dB DNL. Although local conditions may require residential use, it is discouraged in areas with noise levels of 65 to 70 dB DNL, and strongly discouraged in areas with noise levels of 70 to 75 dB DNL. Nearly all studies analyzing aircraft noise and residential compatibility recommend no residential uses in noise zones above 75 dB DNL. The additional noise exposures that would result from the Proposed Action should be considered in any future land use planning in the potentially affected areas. The *Okaloosa County Year 2020 Comprehensive Plan* indicates that the land use in Valparaiso and Shalimar would remain static (Okaloosa County, 2009).

In regard to on-base housing for the ongoing MHPI initiative, proposed Alternative 2, parcels 2 through 8 would require sound attenuation for 65–75 dB DNL, and any exposure exceeding 75 dB DNL would exclude the area from residential usage. Under Alternative 3, parcels 2 and 3 are near a water reclamation facility and an effluent spray field, which may present land use compatibility issues.

Socioeconomics and Environmental Justice

The JSF personnel began to beddown in the region with the arrival of the first aircraft in calendar year (CY) 2011, and will continue until CY 2021. This beddown would continue to stimulate the economic activity in the region of influence (ROI) and would also have an increase in construction spending as Eglin AFB begins to modify or to construct facilities to accommodate the new aircraft. The addition of military personnel and the increase in construction spending induces additional employment, income, and demand for public services in the ROI. A detailed analysis of these impacts is provided in Chapter 4, Section 4.5, *Socioeconomics and Environmental Justice*.

Concurrent with the beddown of the JSF at Eglin AFB, several other large construction and infrastructure improvement projects are expected, including the MHPI and major projects at three airports within the ROI: Destin-Fort Walton Beach Airport, Bob Sikes Airport, and DeFuniak Springs Airport. These construction projects, as well as the improvement projects planned for Hwy 85, Hwy 87, and Hwy 123, would contribute to the regional economy by creating additional employment, especially in the construction and construction-related industries. The various airport improvements were scheduled to overlap with the construction scheduled for the JSF beddown. The magnitude of these construction projects is such that it is possible that construction workers may migrate to the region or possibly commute daily or weekly from outside the region. However, these construction projects are temporary and the change in population, if any, from the construction workers is not expected to contribute to a permanent increase in the region's population.

Under the alternatives for the JSF, disproportionate concentrations of minority and/or low-income populations underlie noise levels of 65 dB DNL or greater in the vicinity of proposed airfields that would be utilized by the F-35; these populations would be subject to adverse noise impacts from these noise levels. Children under the age of 18 would also be subject to noise levels greater than 65 dB DNL. While these noise impacts would be adverse, the number of children affected would not be disproportionate to the total population affected. Population projections for Okaloosa County predict an average annual population increase of 1.2 percent per year between 2000 and 2030. For children under the age of 18, population projections predict an average annual increase of less than one percent per year. Assuming that the population increases occur within the areas affected by noise levels greater than 65 dB DNL, additional minority, low-income, and youth populations could be adversely impacted. There are several schools that would be affected by noise levels above 65 dB DNL and in some cases, above 75 dB DNL (Chapter 4, Section 4.5, *Socioeconomics and Environmental Justice*). However, these potentially significant impacts are a direct result of the JSF flight training. It is not expected that the planned construction activities for the MHPI, or at any of the airports, would exacerbate or contribute to the impacts resulting from the JSF beddown due to the location of these projects and the locations of the impacted schools. Therefore, no significant cumulative impacts are anticipated for socioeconomic factors or environmental justice populations.

There are a number of factors that affect property values that make predicting impacts difficult. Factors directly related to the property such as size, improvements, and location of the property, as well as current conditions in the real estate market, interest rates, and housing sales in the area are more likely to have a direct adverse impact on property values. Several studies have been conducted analyzing property values as they relate to military and civilian aircraft noise. One study conducted a regression analysis of property values as they relate to aircraft noise at two military installations (Fidell et al., 1996). This study found that while aircraft noise at these installations may have had minor impacts on property values, it was difficult to quantify that impact. Other factors such as the quality of the housing near the installations and the local real estate market had a larger impact on property values. Therefore, the regression analysis was not able to predict the impact of aircraft noise on the property values of two comparable properties.

Another study analyzed 33 other studies attempting to quantify the impact of noise on property values (Nelson, 2003). The study results show that there is potential for an adverse impact on property values as a result of aircraft noise and estimate that the value of a specific property could be discounted between 0.5 and 0.6 percent per decibel when compared with a similar property that is not affected by aircraft noise. However, additional indications are that the discount for property values as a result for noise would be higher for noise levels above 75 dB DNL. Although property values are more likely to be directly affected by other factors, such as property or neighborhood characteristics and the local real estate market, there may be the potential that aircraft noise could have an adverse impact on property values.

Transportation

Programmed and planned improvements in the Okaloosa/Walton County area may affect the study area. Programmed projects are currently funded for construction within the next five years and were generally considered to be complete for the end-state analyses. Planned projects are not currently funded but have been included in the Transportation Planning Organization's (TPO's) *2030 Long Range Transportation Plan* and *Cost Feasible Plan* (TPO, 2007). The *Cost Feasible Plan* projects reasonably available future funding based on past funding, and identifies projects anticipated to be built with the projected revenues. The 2030 plan identifies several projects that will positively impact roadways in the study area. Tables showing the planned and programmed improvements are included in Appendix B, *Transportation*.

These roadways are projected to be built by 2030, 14 years past the planning horizon of this study. While the TPO may prioritize projects, there is no specific list of projects that are anticipated to be complete by the project end state.

All of the future year (2016) traffic impact analyses conducted for the SEIS alternatives included the roadway projects that are currently funded for construction in the study area. In addition, all of the analyses took into account population and employment growth that is anticipated to occur off-base in Okaloosa and Walton Counties between now and 2016. This future year growth is included in all of the 2016 traffic analyses.

The planned 2030 roadway projects may partially address some of the needed improvements identified in these analyses; however, these projects may not be funded until after the SEIS actions are complete. Any of these projects would help in addressing the roadway needs identified in these analyses and would have a positive impact on the roadway network in general. The results of this analysis indicate that there are several roadways operating deficiently in the study area today, and the number of deficient roadway segments would increase by 2016 when the SEIS alternatives and area growth are taken into consideration.

Utilities

Of the actions described as potentially creating cumulative impacts, several pertain to utilities on Eglin AFB and two pertain to utilities on the Eglin Range. None of the regional development projects would create cumulative impacts on the utilities. As the overall use of electricity and natural gas is projected to be less than current capacity, it is not expected that the relevant reasonably foreseeable actions would have a cumulative impact.

The MHPI project for Eglin AFB would create cumulative impacts on the amount of potable water consumed and the amount of wastewater produced when combined with the proposed building construction and demolition (C&D) projects. In conjunction with the additional wastewater resulting from the proposed JSF beddown, the total wastewater increase that could result once all of these projects are complete would be 0.736 million gallons per day (mgd) of wastewater. Considering the total capacity for wastewater treatment on Eglin Main Base is 2.5 mgd and 23.5 percent of the total capacity is currently being used (as of 2011), the additional 0.736 mgd would increase the amount of capacity being used to 53 percent of the total permitted capacities for the two facilities (Table 5-3).

Table 5-3. Potential Cumulative Impact on Wastewater Treatment Plant Capacity

WWTP	Total Capacity (mgd)	2011 Annual Average (mgd)	Annual Average Including Proposed Projects[1] (mgd)	Percent of Capacity Used
Two Eglin Main Base Treatment Facilities	2.5	0.587	1.323	52.9%

7SFG(A) = 7th Special Forces Group (Airborne); JSF IJTS = Joint Strike Fighter Initial Joint Training Site;
mgd = million gallons per day; WWTP = wastewater treatment plant
1. Proposed projects include JSF IJTS, 7SFG(A) cantonment area, construction/demolition building projects.

The cumulative impact on potable water resulting from the proposed JSF beddown alternatives and other proposed projects on Eglin Main Base would increase the total consumption of potable water on Eglin Main Base to 3.576 mgd (Table 5-4). Considering the permitted average daily limit and maximum daily limit for the Eglin Main Base water systems are 3.62 and 8.99 mgd, respectively, the 3.576 mgd would remain within permitted levels (Table 5-4).

Table 5-4. Potential Cumulative Impact on Permitted Levels of Eglin Main Base Potable Water Systems

Water Supply System	2011 Average Daily Rate (mgd)	Average Daily Rate Proposed projects[1] (mgd estimate)	Total Average Daily Rate (mgd)	Permitted Average Daily Limit (mgd)	Permitted Maximum Daily Limit (mgd)
Two Eglin Main Base Water Systems	1.356	1.22	3.576	3.62	8.99

7SFG(A) = 7th Special Forces Group (Airborne); JSF IJTS = Joint Strike Fighter Initial Joint Training Site;
mgd = million gallons per day
1. Proposed projects include JSF IJTS, housing privatization, construction/demolition building

Air Quality

The Proposed Action would incrementally contribute air pollution emissions during construction and would allow for increased air pollutant emissions thereafter associated with operations, maintenance, and travel of residents. This contribution would relate to regional air quality goals and attainment standards. The contribution from the Proposed Action would be negligible on a regional scale, as C&D impacts would be short-term and end when the contractors completed the project. Aircraft emissions would be ongoing and would be a permanent change in annual air emissions. Note that as the F-35s are introduced to Eglin AFB, the F-15s previously at Eglin have been phased out. The air emissions are expected to have a slight net increase from aircraft emissions. Air emissions associated with the project represent a small percentage of the Okaloosa, Santa Rosa, and Walton Counties' annual emissions. Project emissions would not contribute to other county emissions in any applicable manner.

Regional development projects consist of construction or improvement projects. Air emissions from these activities would be temporary, intermittent, and minor. As a result, the Air Force does not expect cumulative impacts associated with air emissions from the Proposed Action and the regional development projects to adversely affect regional air quality. The cumulative impacts include impacts associated with the No Action Alternative, plus the regional projects.

Safety

Implementation of any of the activities associated with munitions, ordnance, or explosives would not be expected to prevent or significantly limit the ability of range managers to conduct EOD and range maintenance activities. All ordnance would be handled by trained and qualified personnel in accordance with all explosive safety standards and detailed published technical data. Munitions storage would take place in designated and approved areas. Therefore, there would be no cumulative impacts related to explosives safety.

Regional development actions include upgrades to or expansion of two regional airports (the Destin-Fort Walton Beach Airport and the DeFuniak Springs Airport). This may eventually lead to increased air traffic overall in the area. Viewed in conjunction with proposed JSF flight training activities, there is potential for cumulative effects to require re-evaluation or alteration of flight patterns in order to maintain flight safety in the region. Current safety policies and procedures at Eglin and regional airports are designed to ensure that the potential for aircraft mishaps is reduced to the lowest possible level. These safety policies and procedures would continue under the JSF flight training and anticipated future actions at regional airports. Because the total number of military and commercial flights is likely to increase, it is expected that the number of bird strikes per year would similarly increase. However, the overall risk associated with bird/wildlife-aircraft strikes is expected to remain low.

Solid Waste

Solid waste generation at Eglin AFB would increase due to the increased number of personnel and operations as well as the construction, demolition, and renovation activities to support the JSF flight training. These activities would have a cumulative impact on landfill capacity available within the ROI. In addition, activities identified under the No Action Alternative and other actions being undertaken by civilian interests will result in the generation of additional solid wastes requiring disposal. Due to the existing landfill capacity and number of landfills available within the vicinity, the overall cumulative impact with regard to available landfill capacity is anticipated to be minimal, as sufficient capacity exists to provide for the disposal of solid wastes generated within the area for the foreseeable future. Although sufficient landfill capacity is available within the area for the disposal of solid wastes associated with planned and ongoing activities, short-term impacts may be realized depending upon the number of projects (planned and ongoing) utilizing an individual landfill. Short-term impacts may affect the ability to schedule delivery of wastes for disposal at given landfills or result in longer turnaround time for trucks due to delays in unloading. Because it is not known which landfills are being utilized by any given project or activity, short-term impacts are identified as a potential but may not be realized depending upon the usage of individual landfills.

Reasonably foreseeable future actions identified for Eglin AFB and the region include construction, demolition, and/or renovation of existing structures as discussed under the No Action Alternative and other actions (e.g., regional development) in this chapter. These projects would contribute to the available disposal capacity within the area, as additional debris would be generated from these planned activities. Although it is not possible to accurately estimate the mass of waste associated with these projects with available information, several thousand tons of debris would be associated with the C&D from these projects. This would result in a cumulative impact that would reduce the overall capacity of landfill space available within the area for the disposal of municipal solid and debris wastes.

Hazardous Materials

Eglin AFB has developed programs and procedures to comply with all federal and state hazardous materials and hazardous waste management and reporting requirements. No cumulative impacts on hazardous material and hazardous waste management are anticipated.

Many projects (past, present, and future) involve construction on various portions of Eglin AFB. Many Environmental Restoration Program (ERP) sites are located throughout Eglin Main Base and the Eglin Range. Most of these sites have been designated “No Further Action”; however, coordination with Eglin’s Environmental

Restoration Branch must occur prior to any ground-disturbing activities in or around ERP sites to avoid any potential impacts.

Numerous present and future projects, such as the MHPI, involve the demolition of existing buildings to make way for new facilities. Buildings constructed before 1989 and 1978 are likely to contain asbestos and lead-based paint, respectively, to some extent. Eglin has procedures in place if these are encountered and would use certified contractors to assist with removal and disposal. New buildings would not contain these materials, so there would be a cumulative net beneficial effect to the health and safety of military and civilian personnel working in these facilities.

Maintenance activities associated with the JSF would use various hazardous materials and are expected to generate some hazardous wastes. These are not expected to increase in quantity significantly from current operation levels. The reasonably foreseeable future actions do not include the addition of other aircraft. Aircraft maintenance activities are not expected to have an adverse cumulative impact related to hazardous materials and wastes.

Physical Resources

Soils

Changes to soils associated with the JSF beddown would not substantially alter soils in the region. The Proposed Action, including facility construction, and flight activities, are generally consistent with existing uses for Eglin Main Base, Duke Field, and range areas, and would not be expected to substantially affect the soils in these areas. At the JSF alternative beddown locations, it is expected that minimal impacts would occur because much of the alternative locations are urban land or are characterized by minimal slopes and soils not highly susceptible to erosion. In most cases, the soil has already been affected by being nearby or immediately adjacent to runway locations and associated buildings.

Construction-related soil disturbance at multiple adjacent locations can have cumulative impacts. If the actions are concurrent, wind-borne eroded soil and transport through stormwater runoff can have cumulative impacts on water quality. Where the terrain slopes more than 12 percent, transport of soil as a result of stormwater is increased. Soil disturbance from construction activities would not be adverse, provided that best management practices (BMPs) are implemented.

Water Resources

The proposed construction areas for new runways under Alternative 1I, 2A, 2B, and 2C contain portions of creeks and associated wetland and floodplain areas. All construction activities for all alternatives are in areas where no water resources exist. For the proposed locations for new runways and Landing Helicopter Amphibious

(LHA) deck, construction within specific water resources would be avoided so no direct impacts are anticipated. No other construction activities outside the Proposed Action are planned in or near the proposed locations for the new runways or LHA. Therefore, the construction activities associated with the JSF beddown would not contribute to direct adverse cumulative impacts on surface waters, wetlands, or floodplains. Indirect impacts would potentially occur from increased stormwater runoff.

Stormwater runoff can adversely impact water resources, due to its ability to carry sediments and contaminants. The addition of impermeable surfaces (e.g., concrete, asphalt) would result in an increase in stormwater runoff. For the JSF beddown No Action Alternative, Alternative 1A, and Alternatives 2D and 2E, no impacts on water resources from increased stormwater runoff are expected as the majority of alternative locations are already developed. These areas currently have a large amount of impervious surfaces (such as current runway facilities) and stormwater treatment facilities already in place. Implementing Alternative 1I would lead to a considerable amount of added impervious surface in an area that is not currently developed. Likewise, implementing Alternatives 2A, 2B, and 2C would create a large amount of impervious surfaces in undeveloped areas. There are no plans for other construction activities outside the Proposed Action to occur in or near the proposed construction areas for the runways; thus the amount of impervious surfaces is not expected to increase above and beyond those required for this Proposed Action. Furthermore, because these areas consist primarily of highly permeable Lakeland soil that has not been previously developed or compacted and each site would implement pertinent stormwater management measures, including obtaining the proper permits to avoid adverse effects, it is not likely that the JSF beddown would contribute to adverse cumulative impacts.

If all projects include implementation of site-specific management actions and BMPs, it is unlikely that adverse cumulative impacts on water resources would occur.

Biological Resources

Localized loss or degradation of habitat, noise impacts, or direct physical impacts on species can have a cumulative impact when viewed on a regional scale if that loss or impact is compounded by other events with the same end result. Analysis of potential impacts has identified minimal potential for direct physical impacts or noise impacts on sensitive species, provided Eglin user groups implement management actions and regulatory requirements. Regionally and cumulatively, very few acres of sensitive habitat would be cleared for the SEIS and other upcoming Eglin activities (less than 0.1 percent of Eglin land). Similar habitats exist on other portions of Eglin and on nearby public lands (e.g., Blackwater River State Forest, Conecuh National Forest); these areas would continue to be managed as high-quality, significant habitats. Thus, on a regional scale, upcoming land clearing at Eglin would result in only a small reduction in sensitive habitats and would not be significant.

Eglin AFB has an estimated 390,000 acres of potential tortoise habitat, with the majority of it presently unoccupied. Up to 22 known active gopher tortoise burrows may be affected by direct land clearing. Due to the large amount of potential tortoise habitat on Eglin, relocation could easily occur; thus, direct impacts on the gopher tortoise population would be minimal. Of more concern would be the loss of suitable acres of Sandhills habitat on public land due to the rapid reduction in gopher tortoise habitat on surrounding private lands. Eglin AFB has served as a relocation area for off-site tortoises in the past, and the Florida Fish and Wildlife Conservation Commission would like to continue to move tortoises to Eglin to preserve the species, pending the U.S. Fish and Wildlife Services (USFWS) decision on its federal listing status. Only 1 percent of Eglin's Sandhills habitat would be cleared for upcoming Eglin activities, leaving many acres of potential tortoise habitat. Cumulatively, Eglin activities would not result in significant adverse effects on the gopher tortoise.

Eglin contains over 95 percent of the total of Okaloosa darter streams (236 miles). Recognizing the importance of preventing excess sediment from reaching darter streams, Eglin is actively restoring darter streams and surrounding riparian areas to reduce sedimentation, thus promoting the recovery of the Okaloosa darter population. Eglin has sited new ranges and construction areas to avoid riparian areas, thus minimizing direct impacts and indirect sedimentation impacts. At most, land clearing and construction would potentially affect only a couple of miles of stream. Due to the importance of erosion control near Okaloosa darter streams, stream buffers would be maintained at all darter streams where upcoming clearing and construction would occur, and appropriate erosion control measures would be employed during clearing and construction. Cumulatively, activities at Eglin would not result in notable adverse effects to the Okaloosa darter and may actually result in overall improvements in the darter population through past, present, and future restoration activities.

Eglin AFB has the largest red-cockaded woodpecker (RCW) population in the western portion of the Florida Panhandle, with 459 active clusters. Together with Blackwater River State Forest and Conecuh National Forest (southern Alabama), there are over 500 active clusters in the region. Direct land clearing for Base Realignment and Closure (BRAC) and other past, present, and foreseeable projects would impact less than 0.4 percent of the 210,000 acres managed for RCWs on Eglin. Additionally, Blackwater and Conecuh forests maintain approximately 28,000 acres of foraging habitat and are actively restoring additional acreage to create potential RCW habitat. Up to 11 active and 16 inactive RCW trees may be cut for BRAC; however, there are almost 4,300 inactive RCW trees on Eglin. Regionally, the loss of 11 active and 16 inactive RCW trees and less than 900 acres of RCW foraging habitat would not significantly impact RCWs.

Although upcoming land clearing would directly affect only a small portion of Eglin (approximately 1 percent), far-reaching indirect impacts may occur due to increased mission activity, new construction in previously undeveloped fire-dependent habitats, and continued development in the communities surrounding Eglin AFB. The primary cumulative impact on biological resources would be related to reductions in prescribed fire on Eglin AFB. Multiple species, particularly the RCW, are dependent on fire to maintain quality habitat. The long-term effectiveness of alternate management techniques such as mechanical or chemical understory control is uncertain, but these techniques would be employed in foraging habitat and other high priority areas where prescribed burning is restricted. Due to the importance of the Eglin RCW population regionally (Eglin's is a core population), reductions in quality foraging habitat may affect future growth potential because Eglin would not be able to put recruitment clusters in previously designated areas, delaying Eglin's population recovery. In addition, Eglin would likely lose the ability to use a number of clusters as donors for translocation, which may affect not only the potential for Eglin's population to grow, but also other partners in the Southern Regional Translocation cooperative because Eglin may not be able to provide as many birds for translocation. Cumulatively, reductions in prescribed fire may negatively affect RCWs on Eglin through group isolation, habitat fragmentation, habitat degradation, and loss of foraging habitat, but group demography, population level, and recovery unit level would not be affected.

Projected impacts on certain biological resources from mission activities increase when viewed cumulatively with other activities occurring regionally and in the future (e.g., loss of gopher tortoise habitat regionally). In other cases, projected impacts decrease when viewed on a larger spatial and temporal scale (e.g., clearing of RCW foraging habitat). Although negative impacts would occur on some biological resources, overall, mission activities, in concert with other regional and upcoming future activities, would not threaten the continued existence of any biological resources; thus, impacts would not be significant. Implementation of management actions, regulatory requirements, and an increase in Eglin AFB-prescribed fire support would further reduce the potential for negative impacts on biological resources.

Cultural Resources

Damage to the nature, integrity, and spatial context of cultural resources can have a cumulative impact if the initial act is compounded by other similar losses or impacts. The alteration or demolition of historic structures and likewise the disturbance or removal of archaeological artifacts may incrementally impact the cultural and historic setting of Eglin AFB.

None of the Eglin Range or region development projects discussed have been identified as contributing to cumulative impacts on archaeological resources. In terms of historic resources, the potential for pre-World War II (1935) to Cold War Era military resources exists across most of Eglin AFB. If impacts on these resources are anticipated due to range activities, plans for the protection or mitigation of these resources must be developed by Eglin's Cultural Resources Branch in consultation with the State Historic Preservation Officer (SHPO) and other consulting parties as appropriate. With the exception of the MHPI planned action, no cantonment area activities have the potential to cumulatively affect cultural resources. The MHPI program includes the demolition, construction, and renovation of military family housing units at Eglin AFB and Hurlburt Field. Within the project areas for the MHPI are two Historic Districts (Camp Pinchot and Eglin Field) that are listed on the National Register of Historic Places (NRHP).

Within JSF beddown alternative areas, there is one Historic District (Eglin Field) listed on the NRHP and one Historic District (Strategic Air Command [SAC] Alert) considered to be eligible for the NRHP. The individual structures within the Eglin Field and SAC Alert Historic Districts are not listed on the NRHP individually; they are listed inclusive of the District as a whole. Demolition of contributing resources without prior mitigation has the potential of affecting the District as a single resource. Demolition or modification of structures within these districts may result in the degradation of Eglin's Historic Districts.

If proper mitigation or protective measures are undertaken in consultation with the SHPO and other consulting parties within these aforementioned Historic Districts (Camp Pinchot, Eglin Field, and SAC Alert) to affected structures, no cumulative impacts are expected for this resource area.

5.2 OTHER ENVIRONMENTAL CONSIDERATIONS

5.2.1 Relationship Between Short-Term Uses and Long-Term Productivity

Construction, demolition, and renovation-related activities would result in a short-term use of resources. Long-term productivity impacts are determined by comparing the project's impacts against long-term regional and local planning objectives. Impacts are associated with land use changes, population increases, and the related traffic and socioeconomic factors. The short- and long-term effects of the Proposed Action and alternatives are summarized below.

Short-Term Uses

All alternatives would have minor short-term effects related to their construction activities through the use of construction-related materials, fuels, etc. The significant economic benefits created during construction in the form of jobs, and the direct and indirect demand for goods and services, would offset the short-term use of the environment.

Long-Term Productivity

Long-term adverse impacts on productivity as a result of unmitigated short-term impacts and uses would include the following:

- Increased traffic in the local area
- Increased noise levels associated with the F-35
- Increased demand for housing
- Increased demand for utilities
- Increases in mobile air pollution sources

Long-term beneficial impacts on productivity would include the following:

- Overall support of the region's continued economic development through:
  - Creation of more jobs locally
  - Increased tax base
  - Increased revenues for local businesses
  - Increased revenues for local utilities
  - Increased housing construction

Short-Term Uses Versus Long-Term Productivity

The two- to three-year construction/demolition period for all alternatives would result in a short-term increase in employment, income, and net fiscal benefits and revenues in the surrounding community. Additionally, there would be a short-term increase in the amount of local building supplies needed to execute the project. It is not expected that the availability of these resources for other users would be reduced due to the small size of the project relative to the regional building industry.

Local short-term resource uses resulting from all alternatives would be consistent with the maintenance and enhancement of long-term productivity for the local communities and state and region; use of the Eglin Military Complex as a center of excellence for military testing and training is consistent with regional planning objectives, and Eglin's continued growth is beneficial and essential from an economic standpoint.

Many of the potential adverse impacts on long-term productivity are the result of short-term factors, which are often mitigated through planning aspects when implementing a proposed action and/or alternatives; traffic is one example. The Proposed Action and alternatives analyzed in this document would have immediate short-term impacts on traffic with long-term implications.

Typically, the DoD looks to normal civil highway programs to make highway improvements to defense installations because the installations generate major economic benefits. The Air Force, local planning agencies, and the Florida Department of Transportation (FDOT) would work to address transportation issues to ensure that long-term impacts would be mitigated through proper planning and design of local roadways and transportation infrastructure. The Defense Access Road Program is one method for DoD to help pay for public highway improvements required as a result of sudden/unusual defense-generated traffic impacts. The challenge is accommodating Eglin's growth and the needs of the local community in a manner that is mutually beneficial. While there are potential adverse impacts on long-term productivity, many impacts can be mitigated, resulting in benefits to long-term productivity associated with local increases in employment, income, and net fiscal benefits and revenues that outweigh short-term impacts.

5.2.2 Irreversible and Irretrievable Commitment of Resources

NEPA requires environmental analysis to identify any irreversible and irretrievable commitments of resources involved in the implementation of the Proposed Action or alternatives. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. *Irreversible* effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. *Irretrievable* resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site).

Implementing the Proposed Action through any of the alternatives would require a commitment of natural, physical, human, and fiscal resources. In all of these categories, irreversible and irretrievable commitments of resources would occur. Land required for new construction would be irreversibly committed during the functional life of the facilities; in some cases, land uses would change from undeveloped to developed. Although it is possible for land to revert to its former state if the facilities were abandoned and destroyed, the likelihood of such an occurrence for established facilities would be low.

Considerable amounts of fossil fuels and construction materials, such as steel, cement, aggregate, and bituminous material, would be expended under the action alternatives. These physical resources should generally be in sufficient supply during the proposed project initiation, and their commitment to the project would not have an adverse effect on the resource's continued or future availability.

Some biological resources would be irreversibly and irretrievably lost with construction of the proposed project, and some areas of wildlife habitat would be lost. However, based on the size of the Eglin Complex compared with the amount of acreage that would be used for facilities, the loss would be minimal; sensitive habitat areas would be avoided to the extent practicable and impacts on sensitive species would be mitigated as discussed in the FEIS.

In terms of human resources, labor would be used in preparation, fabrication, and construction of the project. Labor is generally not considered to be a resource in short supply, and commitment to the project would not have an adverse effect on the continued availability of these resources. Project construction would require a substantial expenditure of funds.

The proposed commitment of natural, physical, human, and fiscal resources is based on the requirements mandated by Congress through the BRAC Commission's recommendations. It is anticipated that businesses, employees, and residents of the local area would benefit from improved economics resulting from implementation of the Proposed Action.

This page is intentionally blank.

6. LIST OF PREPARERS

Name/Title	Project Role	Subject Area	Experience
Amefia, Koffi B.S. Electrical Engineering M.S. Civil Environmental Engineering	Author	Noise	13 years, noise analysis
Austin, John K. Environmental Scientist B.A. Biology M.S. Environmental Science	Author	Noise	12 years, environmental science/noise analysis
Baumann, E.I.T., Alysia NEPA Specialist/Planner B.S. Chemical Engineering	Author	Hazardous Materials and Wastes, Air Quality, and Land Use, General Support	10 years, environmental science
Baxter, Rachel Economist B.A. Economics	Author	Socioeconomics and Environmental Justice	8 years, economic analysis
Boykin, Brad Environmental Scientist B.S. Biomedical Science MBT Biotechnology	Author	General Support, Air Quality, Biological Resources, Health and Safety	7 years, biochemistry and environmental fields
Brecken, Jeri Environmental Scientist M.S. Biology B.S. Forest Resources and Conservation	Technical Support/Review		22 years environmental sciences
Combs, Jennifer Technical Editor B.S. Communications, Journalism	Editor		23 years, editing
Daniels, Karen L. Environmental Scientist B.S. Biology M.S. Fisheries M.S. Applied Statistics	Technical Reviewer		30 years, environmental sciences
Deacon, Mike Environmental Scientist B.S. Environmental Health B.S. Environmental Studies	Author	Land Use	21 years, environmental science
Diaz, Luis Environmental Engineer M.S. Environmental Engineering B.S. Aerospace Engineering	Author	Hazardous Materials, Safety	20 years, environmental engineering, safety, pollution prevention, and waste minimization

Name/Title	Project Role	Subject Area	Experience
Geeslin, Jennifer (ICF International) Public Affairs Specialist B.A. Speech Communications	Public Affairs		8 years, public affairs
Hansen, Amanda Environmental Scientist Ph.D. Meteorology M.S. Meteorology B.S. Marine Chemistry	Technical Support	Executive Summary; Airspace	10 years, environmental sciences; 8 years, software engineering and systems data interpretation
Heath, Mindelyn (HDR, Inc.) Transportation Planner B.S. Environmental Design Bachelors of Urban Planning and Development, AICP	Author	Transportation	11 years, transportation planning
Koralewski, Jason Archaeologist M.A. Anthropology M. Liberal Studies, Archaeology B.A. Anthropology	Author	Soils and Cultural Resources	17 years, environmental science
Long, Geral L. B.S. Biology M.S. Ecology Post Graduate studies in Range Management	Author	Military Operations Noise	42 years military flight operations, environmental and noise impacts
McKee, W. James (Jamie) Environmental Scientist B.S. Marine Biology	Author	Biological Resources	24 years, environmental science with experience in freshwater, estuarine and marine applications
McLaurine, Henry Environmental Scientist M.S. Biology B.S. Environmental Science	Author, Technical Reviewer, Technical Lead, Project Manager		18 years, environmental science, air quality
Nation, Mike Environmental Scientist B.S. Environmental Science/Policy, Minor in Geography; A.A. General Science	GIS Analyst		13 years, environmental consultant, interagency coordination, GIS Arc View applications
O'Steen, Diana Electronic Publication Specialist	Document Formatting		20 years, document management
Robydek, Amanda Environmental Scientist B.S. Environmental Science	Author	Water Resources	5 years, environmental sciences
Sands, Amy Environmental Scientist B.S. Environmental Science M.A.S. Environmental Policy and Management	Deputy Project Manager, Technical Review/Support, Utilities		8 years, environmental science and GIS mapping
Truitt, Jerry CHMM (Masters Level) Environmental Engineer/Compliance Specialist B.S. Geological Engineering	Author	Solid Waste	24 years, environmental engineering and compliance support

Name/Title	Project Role	Subject Area	Experience
Utsey, Tara Publications Team Manager Technical Editor B.A. Liberal Arts	Lead Project Editor		18 years, editing; 13 years, project coordination
Van Tassel, Robert E. Program Manager B.A. Economics M.A. Economics Post Graduate studies in Regional and Environmental Economics	Program Analysis, coordination, Executive Summary, and related support		38 years, environmental planning, economics, environmental analysis, and Environmental Impact Analysis Process
Ward, Carmen Environmental Engineer M.S. Environmental Engineering, B.S. Chemical Engineering	Author	Technical Support	22 years, environmental engineering
Wilson, Jennifer Copy Editor B.A. English Literature	Editor		9 years, editing

This page is intentionally blank.

7. REFERENCES

AETC/A5RJ, 2009. Personal communication from LtCol James M Abatti, USAF AETC 33 OSS/CC to Thomas L. Chavers, CIV USAF AFMC 96 CEG/CEV, via electronic mail, regarding Duke Field Military Construction (MILCON) requirements. 23 December 2009.

AETC/A5RZ, 2012. Personal communication from Mr. Stephen Thomas, CIV USAF AETC/A5RZ, to Thomas L. Chavers, CIV USAF AFMC 96 CEG/CEV, via electronic mail, forwarding the annual air operations tables for the F-35, which consolidated input from designated Air Force, Marine Corps, and Navy organizational representatives (33FW, HQ Marine Aviation, and COMNAVAIRLANT).

Adams, T., 2012. Eglin AFB CY11 potable water usage data. Provided by Mr. Travis Adams (96 CEG/CEV) via email. 5 January 2012.

Air Combat Command, 1999. *Renewal of the Nellis Air Force Range Land Withdrawal, Legislative Environmental Impact Statement*. U.S. Air Force, Air Combat Command (ACC). March 1999.

American National Standards Institute (ANSI), 2009. *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools*.

Armstrong, R., 2006. Personal communication via telephone between Ralph Armstrong (Environmental Restoration Program [96 CEG/CEVR]) and Luis Diaz (SAIC) regarding ERP sites at Eglin AFB on 07 September 2006.

Beyer, D. E., R. Costa, R. G. Hooper, and C. A. Hess. 1996. Habitat quality and reproduction of red-cockaded woodpecker groups in Florida. Journal of Wildlife Management 60:826-835.

Birdsong, H., 2006. Personal communication via telephone between Hank Birdsong (96 CEG/CEVC) and Luis Diaz (SAIC) regarding hazardous waste management impacts of BRAC actions at Eglin AFB on 17 August 2006.

Brown, R., 2006a. Personal communication between Russell Brown (96 CEG/CEVC) and Mike Nunley and Kim Matyskiela (BRAC IPT) regarding potable water capacities, 21 and 27 March 2006, and 10 April 2006.

Brown, R., 2006b. Personal communication between Russell Brown (96 CEG/CEVC) and Kim Matyskiela (SAIC) on 08 August 2006.

Brown, R., 2012. E-mail communication with Russell Brown (96 CEG/CEVC) regarding WWTP usage data on 10 January 2012.

Busnel, R. G., and J. Fletcher (eds.), 1978. *Effects of Noise on Wildlife*. New York: Academic Press.

Committee on Hearing, Bioacoustics and Biomechanics (CHABA), 1977. *Guidelines for Preparing Environmental Impact Statements on Noise*. National Academy Press, Washington, D.C.

Committee on Hearing, Bioacoustics and Biomechanics (CHABA), 1981. Assessment of Community Response to High-Energy Impulsive Sounds. National Academy Press, Washington, D.C.

Conner, R. N., and D. C. Rudolph, 1991. Forest habitat loss, fragmentation, and red-cockaded woodpecker populations. Wilson Bulletin 103:446-457.

Convery, K. M., and J. R. Walters, 2004. Red-cockaded woodpecker home range and foraging partitions. Pages 526-535 in R. Costa, and S. J. Daniels, editors. Red-Cockaded Woodpecker: Road to Recovery.

Cottereau, P., 1978. Effect of sonic boom from aircraft on wildlife and animal husbandry. Pages 63–79 in J.L. Fletcher and R.G. Busnel, eds., *Effects of Noise on Wildlife*. Academy Press, New York.

Council on Environmental Quality (CEQ), 1997. *The National Environmental Policy Act: A Study of Its Effectiveness after Twenty-five Years*. CEQ, Executive Office of the President. Available on the Internet at http://ceq.hss.doe.gov/nepa/nepa25fn.pdf. January 1997.

Council on Environmental Quality (CEQ), 2010. Top 40 Frequently Asked Questions, (Question 2a), 46 *Federal Register*, 18026 (1981). Available on the Internet at http://ceq.hss.doe.gov/nepa/regs/40/1-10.HTM#1. Last viewed in May 2010.

Cultural Resources Information Management System (CRIMS), 2012. Cultural Resources Information Management System (Restricted Access). Information accessed by Jason Koralewski, SAIC, 30 July.

Delaney, D. K., L. L. Pater, R. H. Melton, B. A. McAllister, R. J. Dooling, B. Lohr, B. F. Britten-Powell, L. L. Swindell, T. A. Beaty, L. D. Carlile and E. W. Spadgenske, 2002. *Assessment of Training Noise Impacts on the Red-cockaded Woodpecker: Final Report*. U.S. Army Corps of Engineers Construction Engineering Research Laboratory. February.

Department of Defense (DoD), 2006a. Department of Defense Standard Practice for Unified Facilities Criteria and Unified Facilities Guide Specifications. MIL-STD 3007F. 13 December 2006.

Department of Defense (DoD), 2006b. Toxics Release Inventory Data Delivery System (TRI-DDS), Version 2001v3.11, web-based reporting database for munitions and range activities. Retrieved from http://www.dod-tridds.org, August 2006.

Department of Defense (DoD), 2009a. Memorandum on Methodology for Assessing Hearing Loss Risk and Impacts in DoD Environmental Analysis. Undersecretary of Defense for Acquisition, Technology and Logistics.

Department of Defense (DoD), 2009b. Toxics Release Inventory Data Delivery System (TRI-DDS), Version 2001v3.11, web-based reporting database for munitions and range activities. Retrieved from http://www.dod-tridds.org, November 2009.

Department of Defense (DoD), 2011. DoD Instruction 4165.57: Air Installation Compatible Use Zones. May 2011. Retrieved from http://www.dtic.mil/whs/directives/corres/pdf/416557p.pdf.

Eglin AFB, 2006. *Integrated Cultural Resources Management Plan, Eglin AFB, Okaloosa, Santa Rosa, and Walton Counties, Florida*. March.

Eglin AFB, 2007. *Main Base Industrial Water Use Survey, Eglin Air Force Base Florida*. Department of the Air Force, Air Force Materiel Command, 96 Civil Engineer Group. December 2007.

Eglin Enterprise Spatial Database, 2010. Database information regarding black bear mortalities from automobile collisions on Eglin AFB. Accessed on 5 February 2010.

Eglin Geographical Information System (GIS), 2009. Eglin Natural Resources Section GIS Data Sets located at Jackson Guard and 96 CEG/CEVSN servers. Eglin AFB.

Engstrom, R. T., and F. J. Sanders, 1997. Red-cockaded woodpecker foraging ecology in an old-growth longleaf pine forest. Wilson Bulletin 109:203-217.

Entrix, 2009. Eglin AFB BRAC Supplemental EIS Habitat Assessment & Biological Survey. Prepared by Entrix Corp. 24 September 2009.

Federal Aviation Administration (FAA), 2012. Aeronautical Information Manual: Official Guide to Basic Flight Information and ATC Procedures, revised 9 February 2012 available http://www.faa.gov/air_traffic/publications/ATpubs/AIM/aim0304.html#sNB871187Mary.

Federal Interagency Commission on Urban Noise (FICUN), 1980. *Guidelines for Considering Noise in Land Use Planning and Control*. June 1980.

Fidell, S., B. Tabachnick; and L. Silvati, 1996. *Effects of Military Aircraft Noise on Residential Property Values*. 16 October 1996.

Finegold, L., S. Harris, and H. Von Gierke, 1994. Community annoyance and sleep disturbance: updated criteria for assessing the impacts of general transportation noise on people. *Noise Control Engineering Journal*, Vol 42, No 1, Jan-Feb.

Fleming, M., 2006. Personal communication between Mark Fleming (Utility Manager, 96 CEG/CER) and Kim Matyskiela (SAIC). August 2006.

Fleming, M., 2012. E-mail communication with Mark Fleming (96 CEG/CEAI) regarding Natural Gas and Electricity usage data on 11 January 2012.

Florida Department of Environmental Protection (FDEP), 2003. EcoSummary: Garnier Creek Fort Walton Beach, Okaloosa County, above SR 189, July 15, 2003. Retrieved from http://water.dep.state.fl.us/eswizard/ecosummary.asp?id=628 on 5 October 2009.

Florida Department of Environmental Protection (FDEP), 2006. 1998 Environmental Protection Agency, Florida 1998 303(d) List. Retrieved from http://www.dep.state.fl.us/water/tmdl/docs/303(d)-2.pdf, on 11 July 2006.

Florida Department of Environmental Protection (FDEP), 2008. *Florida Stormwater, Erosion, and Sedimentation Control Inspector's Manual*. Technical Report. Retrieved from http://www.dep.state.fl.us/water/nonpoint/docs/erosion/erosion-inspectors-manual.pdf on 23 December 2011.

Florida Department of Environmental Protection (FDEP), 2009. Choctawhatchee – St. Andrews Group 3 Basin – Northwest District – Verified List. Hydrologic Units – Choctawhatchee River, Choctawhatchee Bay, Pa River, and St. Andrews Bay. 11 September 2009. Retrieved from http://www.dep.state.fl.us/WATER/watersheds/assessment/docs/303d/group3/cycle2/g3c2_choctaw_verifd_drft.pdf on 5 October 2009.

Florida Department of Environmental Protection (FDEP), 2010. Northwest Florida Water Management District 2009-2010 Land Use. Florida Department of Environmental Protection's Bureau of Watershed Restoration. 1 June 2010. Accessed at http://www.dep.state.fl.us/gis/datadir.htm.

Florida Department of Transportation (FDOT), 2009. *Quality/Level of Service Handbook*.

Florida Fish and Wildlife Commission (FWC), 2008. *Gopher Tortoise Permitting Guidelines.* Tallahassee, Florida. Revised September 2012.

Florida Governor's Action Team on Energy & Climate Change, 2012. Climate Change – Impacts. Accessed at http://www.flclimatechange.us/background-impacts.cfm.

Floyd, R., 2005. Personal communication between Rusty Floyd (Okaloosa County Landfill Site Manager) and Kim Matyskiela (SAIC). 17 June 2005.

Furman, J., 2007. Personal communication via meeting between Mike Nunley (SAIC) and James Furman (96 CEG/CEVSN) regarding fire management, 26 November 2007.

Gault, K., 2009. Personal communication via email between Kathy Gault (96 CEG/CEVSNW) and Stephanie Hiers (SAIC) regarding eastern indigo snakes on Eglin AFB in January 2009.

Gladwin, D. N., K. M. Manci, and R. Villella, 1988. Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: Bibliographic Abstracts. U.S. Fish and Wildlife Service National Ecology Research Center, Fort Collins, CO.

Global Security, 2011. Global Security.org website accessed November 16, 2009. MK-82 Specifications and GBU-31/BLU-109 specifications. http://www.globalsecurity.org/military/systems/munitions/mk82-specs.htm and http://www.globalsecurity.org/military/systems/munitions/blu-109.htm.

Hardesty, J. L., K. E. Gault, and H. F. Percival, 1997. Ecological Correlates of Red-cockaded Woodpecker (*Picoides borealis*) Foraging Preference, Habitat Size, and Home Range Size in Northwest Florida (Eglin Air Force Base). Florida Cooperative Fish and Wildlife Ecology and Conservation, University of Florida, Gainesville, Florida.

Hooper, R. G., and M. R. Lennartz. 1995. Short-term response of a high density red-cockaded woodpecker population to loss of foraging habitat. Pages 283-289 *in* D. L. Kulhavy, R. G. Hooper, and R. Costa, editors. Red-cockaded woodpecker: recovery, ecology and management. Center for Applied Studies in Forestry, College of Forestry, Stephen F. Austin State University, Nacogdoches, Texas, USA.

Innes, R. J., 2009. *Gopherus polyphemus*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available at http://www.fs.fed.us/database/feis/ and accessed on 9 September 2013.

James, F. C., C. A. Hess, B. C. Kicklighter, and R. A. Thum, 2001. Ecosystem management and the niche gestalt of the red-cockaded woodpecker in longleaf pine forests. *Ecological Applications* 11:854-870.

Karl, T. R., J. M. Melillo, and T. C. Peterson, (eds.), 2009. *Global Climate Change Impacts in the United States*, Cambridge University Press.

Kauffman, S., 2006. Personal communication via phone with Mr. Stephen Kauffman (96 CEG/CEVC) regarding hazardous waste generation at the 33 FW and impacts of BRAC actions on hazardous waste management at Eglin AFB. October 2006.

Kindell, C. E., B. J. Herring, C. Nordman, J. Jensen, A. R. Schotz, and L. G. Chafin, 1997. Natural community survey of Eglin Air Force Base, 1993-1996. Final Report. Florida Natural Areas Inventory, Tallahassee, Florida.

Kryter, K., 1980. Physiological acoustics and health. *Journal of the Acoustical Society of America*, Vol 68, No 1, July.

Landers, J. L., and D. W. Speake, 1980. Management needs of sandhills reptiles in southern Georgia. Bulletin Florida State Museum, Biological Science, Vol 27, pp 81–110.

Larkin, R. P., 1996. *Effects of Military Noise on Wildlife: A Literature Review*. USACERL Technical Report 96/21, January, Center for Wildlife Ecology, Illinois Natural History Survey, Champaign, Illinois.

Ludlow B., and K. Sixsmith, 1999. Long term effects of military jet aircraft noise exposure during childhood on hearing threshold levels. *Noise and Health*, Vol 5, pp 33–39.

McBay, C., 2007. Personal communication between Chuck McBay (96 CEG/CER) and Kim Matyskiela (SAIC) regarding electrical and natural gas usage and infrastructure for Eglin AFB. 26 – 31 July 2007.

National Geospatial Intelligence Agency, 2007. Digital Aeronautical Flight Information File. Retrieved from http://164.214.2.62/products/usfif/index.cam, on 12 September 2007.

Natural Resource Conservation Service, 2009. Web Soil Survey. Retrieved from http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm. August 2009.

Nelson, J. 2003. *Meta-Analysis of Airport Noise and Hedonic Property Values: Problems and Prospects*. July 2003.

Northern Trust, 2008. *Knight Sector Plan Washington County, Bay County, and Town of Ebro Scoping Document*. Submitted to the WFRPC by Northern Trust Company, Miami, Florida. 08 December 2008.

Northwest Florida Water Management District, 2009. Retrieved from http://www.nwfwmd.state.fl.us/recreation/choctawhatcheeriver.html on 24 September 09.

Okaloosa County, 2009. *Okaloosa County Comprehensive Plan 2009*. Accessed at http://www.co.okaloosa.fl.us/dept_growth_mgmt_comp_plans.html.

Okaloosa County Water and Sewer Department, 2007. Retrieved from http://www.co.okaloosa.fl.us/doc/dept/ws/abp_letter2.pdf on 28 September 2009.

Okaloosa County Water and Sewer Department, 2009. Arbennie Pritchett Water Reclamation Facility (WRF) Program. Retrieved from http://www.ocwswwtp.com/index.asp.

Overing, J. D., H. H. Weeks, J. P. Wilson, Jr., J. Sullivan, and R. D. Ford, 1995. Soil Survey of Okaloosa County, Florida. USDA, Natural Resources, Soil Conservation Service.

Rosenberg, D. K., and K. S. McKelvey, 1999. Estimation of habitat selection for central-place foraging animals, Journal of Wildlife Management, Vol 63, pp 1028–1038.

Scott, J. R., 2012. Personal communication via email between John R. Scott, Safety Data Manager and Customer Support Division Head – Naval Safety Center and Brad Boykin, SAIC. 19 April 2012.

Sutherland, L. C., 1990. Assessment of Potential Structural Damage from Low-Altitude Subsonic Aircraft. Wyle Laboratories, El Segundo, CA.

Transportation Planning Organization (TPO), 2007. Cost Feasible Report, Okaloosa-Walton 2030 Long Range Transportation Plan. Okaloosa-Walton Transportation Planning Organization and The Florida Department of Transportation, District Three. May 2007.

U.S. Air Force, 1996. *Eglin Range General Plan: A Framework for the Future*. Prepared by the Plans Office of the 46 Test Wing (46 TW/XP in partnership with the Environmental Management Directorate of AFDTC (AFDTC/EM).

U.S. Air Force, 1997. *Interim Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process (EIAP)*. November 1997.

U.S. Air Force, 2001. *Eglin AFB General Plan – Eglin Main and Duke Field*. 796 Civil Engineering Squadron (796 CES/CEORT), Eglin AFB. November 2001.

U.S. Air Force, 2002. *Eglin Military Complex Environmental Baseline Study Resource Appendices, Volume 1 – Eglin Land Test and Training Range*, Appendix G, Safety. Eglin AFB Range Planning Office (46 TW/XPE) March 2002.

U.S. Air Force, 2003a. *Environmental Restoration Program Management Action Plan*. Headquarters, AAC, Eglin AFB. July 2003.

U.S. Air Force, 2003b. Programmatic Agreement between the Air Armament Center (AAC), the Florida State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation, for Cultural Resources Management.

U.S. Air Force, 2006a. *Eglin's Wildfire Specific Action Guide Restrictions.* Eglin AFB. July 2006.

U.S. Air Force, 2006b. Air Installation Compatible Use Zones Study. Eglin AFB, FL. March 2006.

U.S. Air Force, 2006c. *Asbestos Operations Plan*. Headquarters AAC, Eglin AFB, FL. March.

U.S. Air Force, 2006d. *Threatened and Endangered Species Component Plan*, Eglin AFB, 96 CEG/CEVSN.

U.S. Air Force, 2007. *Eglin Integrated Natural Resources Management Plan (2007–2011)*. Department of the Air Force, Natural Resources Section, Eglin AFB. September 2007.

U.S. Air Force, 2008a. *Proposed Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions At Eglin AFB, Florida, Final Environmental Impact Statement*. Prepared by Science Applications International Corporation. October 2008.

U.S. Air Force, 2008b. Air Force Instruction 13-212, Range Planning and Operations, AF/A3O-A. U.S. Air Force. Incorporating Change 1 July 2008.

U.S. Air Force, 2008c. Programmatic Agreement Among Eglin Air Force Base, 7th SFG(A), JSF Program and the Florida State Historic Preservation Officer Regarding the Proposed Implementation of the Base Realignment and Closure (2005) Decision and Related Actions, Eglin Air Force Base, Florida. 6 November.

U.S. Air Force, 2009a. Record of Decision for Implementation of Base Realignment and Closure (BRAC) 2005 Decisions for the Joint Strike Fighter Initial Joint Training Site at Eglin AFB, FL. February 2009.

U.S. Air Force, 2009b. *Environmental Restoration Program Sites Status Report*. Eglin AFB. May.

U.S. Air Force, 2009c. *Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions Final Mitigation and Monitoring Plan for Joint Strike Fighter (JSF) at Eglin AFB, FL*. May 2009.

U.S. Air Force, 2009d. FACT SHEET: Joint Direct Attack Munition GBU-31/32/38, accessed October 2009: www.af.mil/information/factsheets.asp?id+108.

U.S. Air Force, 2009e. *Test Area B-70 Final Range Environmental Assessment, Revision 1*. Eglin Air Force Base, FL. June 2009.

U.S. Air Force, 2009f. *Eglin AFB Base Realignment and Closure (BRAC) Supplemental Environmental Impact Statement Habitat Assessment & Biological Survey*. Prepared by Entrix. 24 September 2009.

U.S. Air Force, 2009g. *Hurlburt Field General Plan*. Department of the Air Force.

U.S. Air Force, 2010a. *Greenhouse Gas Monitoring Plan*. Eglin Air Force Base, FL. Prepared by SAIC. April 1, 2010.

U.S. Air Force, 2010b. *Final Greenhouse Gas Baseline Inventory Report for Eglin Air Force Base, FL*. Prepared by SAIC. May 2010.

U.S. Air Force, 2010c. Hazardous Waste Management, Eglin Air Force Base Instruction 32-7003. Civil Engineering, 96 CEG/CEVCP. 1 November 2010.

U.S. Air Force, 2010d. Final Spill Prevention, Control, and Countermeasure Plan Update. Eglin Air Force Base, Florida. July 2011.

U.S. Air Force, 2010e. *Asbestos Management Plan*. EAFB Plan 32-3. 20 April.

U.S. Air Force, 2010f. *Lead-Based Paint Management Plan*. EAFB Plan 32-4. 15 April.

U.S. Air Force, 2011a. *Gulf Regional Airspace Strategic Initiative Strategic Plan*. Prepared by SAIC. March.

U.S. Air Force, 2011b. Air Force Safety Center website. Updated December 28, 2011, and retrieved from http://www.afsec.af.mil/shared/media/document/AFD-080114-063.pdf in April 2012.

U.S. Air Force, 2011c. *Environmental Assessment for the F-22 Operational Squadron and T-38 Detachment Beddown at Tyndall AFB, Florida.* Prepared by SAIC. August 2011.

U.S. Air Force, 2011d. *Final Environmental Impact Statement for the Military Housing Privatization Initiative (MHPI) at Eglin AFB and Hurlburt Field, Florida.* June.

U. S. Air Force, 2012. USAF Wildlife Strikes by Phase of Operation. Air Force Security Center. Retrieved from http://www.afsec.af.mil/shared/media/document/AFD-080130-054.pdf in May 2012.

U.S. Air Force, 2012a. *Final Environmental Assessment for Aviation Foreign Internal Defense Beddown (AvFID) at Duke Field, Eglin AFB, Florida*. July 2012.

U.S. Army Center for Health Promotion and Preventive Medicine [USACHPPM], 2005. *Operational Noise Management*. November 2005.

U.S. Census Bureau, 2010. State and County QuickFacts. Okaloosa County, Santa Rosa County, Walton County, and Florida. Retrieved from http://www.census.gov April 2012.

U.S. Department of the Interior, 2005. "Implementation Procedures for Use of Foraging Habitat Guidelines and Analysis of Project Impacts under the Red-cockaded Woodpecker (*Picoides borealis*) Recovery Plan: Second Revision," provides implementation guidance for use of the foraging habitat standards presented in the RCW recovery plan. 20 May 2005.

U.S. Environmental Protection Agency (USEPA), 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety*. March 1974.

U.S. Environmental Protection Agency (USEPA), 1982. *Guidelines for Noise Impact Analysis*. Report No. 550/9-82-105. April.

U.S. Environmental Protection Agency (USEPA), 1993. *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*. EPA-840-B-93-001c. January 1993.

U.S. Environmental Protection Agency (USEPA), 1998. Characterization of Building-Related Construction and Demolition Debris in the United States. EPA530-R-98-010. June 1998.

U.S. Environmental Protection Agency (USEPA), 2003. Estimating 2003 Building-Related Construction and Debris Materials Amounts. EPA530-R-09-002, March 2009.

U.S. Environmental Protection Agency (USEPA), 2006. *Greenhouse Gas Emissions from the U.S. Transportation Sector 1990-2003*. Office of Transportation and Air Quality. March 2006.

U.S. Environmental Protection Agency (USEPA), 2008. The National Emissions Inventory 2008 Version 2. Retrieved from http://www.epa.gov/ttn/chief/net/2008inventory.html on April 20, 2012.

U.S. Environmental Protection Agency (USEPA), 2009a. *Potential for Reducing Greenhouse Gas Emissions in the Construction Sector*. February 2009. Accessed from http://www.epa.gov/ispd/pdf/construction-sector-report.pdf on 20 August 2009.

U.S. Environmental Protection Agency (USEPA), 2009b. *U.S. Environmental Protection Agency: Transportation and Climate*. Accessed from http://www.epa.gov/oms/climate on 9 July 2009.

U.S. Environmental Protection Agency (USEPA), 2010. *Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2009*. EPA-530-F-010-012. December.

U.S. Fish and Wildlife Service (USFWS), 1997. Letter from USFWS to Eglin AFB regarding inactive RCW trees on Eglin Main Base. 05 June 1997.

U.S. Fish and Wildlife Service (USFWS), 2001. Buffers: An Effective Tool for Watershed Protection. USFWS Fact Sheet. September 2001.

U.S. Fish and Wildlife Service (USFWS), 2007. *National Bald Eagle Management Guidelines*. May 2007.

U.S. Marine Corps, 2010. *Final United States Marine Corps F-35B West Coast Basing EIS, volumes 1–2, October.*

U.S. Navy, 2010. *Air Installations Compatible Use Zones Study for NAS Pensacola and NOLF Saufley*. U.S. Department of the Navy, Naval Facilities Engineering Command Southeast, Jacksonville, Florida.

Walters, J. R., S. J. Daniels, J. H. Carter, III, and P. D. Doerr. 2002. Defining quality of red-cockaded woodpecker foraging habitat based on habitat use and fitness. Journal of Wildlife Management 66:1064-1082.

West Florida Regional Planning Council (WFRPC), 2008. *Knight Family Trust Property Plan Washington-Bay County, Town of Ebro, Optional Sector Plan Report and Recommendations*. Pensacola, Florida. December 2008.

West Florida Regional Planning Council (WFRPC), 2010. *Focusing on our Community West Florida Regional Planning Council Annual Report 2010*. Pensacola, Florida. 2010.

Wilson, D. S., H. R. Mushinsky, and R. A. Fischer, 1997. Species profile: Gopher Tortoise (Gopherus polyphemus) on military installations in the southeastern United States. Technical Report SERDP-97-10, U. S. Army Engineers Waterways Experiment Station, Vicksburg, MS.

Wyle Laboratories, 2005. Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations. April 2005.

Wyle Laboratories, 2010. Mitigation Scenarios 1F and 1G Results. Memorandum from Royce Bassarab and Gerald Long, Wyle Laboratories, to Henry McLaurine and Amy Sands, SAIC, on 15 June 2010.

This page is intentionally blank.