Environmental Assessment for Facilities Expansion at Naval Nuclear Power Training Unit-Charleston (NPTU Charleston), Joint Base Charleston, South Carolina

September 2012

ABSTRACT

The United States Navy (Navy) as the lead agency with the United States Air Force (USAF) as a cooperating agency has prepared this environmental assessment (EA) to assess potential impacts from proposed infrastructure improvements needed to accommodate both the current, as well as the anticipated increase of student numbers and the newer Moored Training Ship replacements at the Nuclear Power Training Unit-Charleston (NPTU Charleston), Joint Base Charleston (JB CHS), South Carolina (SC). This EA presents the impact analyses for the five action alternatives and no-action alternative. The effects of these alternatives are discussed in regard to land use and coastal zone management; geology, topography, seismology, and soils; biological resources; water resources; socioeconomics; transportation; public health and safety; hazardous materials and waste; infrastructure and utilities; and nuclear and radiological aspects. Cumulative impacts are also analyzed in the EA. With implementation of management actions to avoid and minimize impacts as well as mitigating wetland effects, no significant impacts were identified.

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DEPARTMENT OF DEFENSE
Department of the Navy
Department of the Air Force

FINDING OF NO SIGNIFICANT IMPACT (FONSI) AND FINDING OF NO PRACTICABLE ALTERNATIVE (FONPA) FOR THE FACILITIES EXPANSION AT THE NAVY NUCLEAR POWER TRAINING UNIT CHARLESTON, JOINT BASE CHARLESTON, BERKELEY COUNTY, SOUTH CAROLINA

Pursuant to the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations (CFR) Parts 1500-1508) implementing the National Environmental Policy Act (NEPA), Department of the Navy (Navy) implementing requirements 32 CFR Part 775, and Department of Air Force (Air Force) requirements 32 CFR part 989, the Navy as the lead agency with cooperation from the Air Force gives notice that an Environmental Assessment (EA) has been prepared and an Environmental Impact Statement (EIS) is not required for the Infrastructure Improvements and Expansion to Support Navy Nuclear Power Training Unit (NPTU) Operations and Training at Joint Base Charleston Naval Weapons Station (JB CHS-W), South Carolina.

Purpose and Need: The purpose of the Proposed Action is to provide infrastructure to support an increase in student throughput and a newer moored training ship (MTS) design. The need for the Proposed Action is to ensure that NPTU Charleston's mission of providing highly qualified nuclear operators and supervisors for the Naval nuclear-powered Fleet is accomplished.

Proposed Action: The Navy as the lead agency with cooperation from the Air Force proposes to: renovate, and upgrade existing facilities and infrastructure; construct academic and training facilities; relocate MTS support systems; increase the number of parking spaces; expand pier facilities to support uninterrupted MTS operation and training during the transition to the newer MTSs; demolish and consolidate the functions of the current storage and handling facility (Building 43); and implement improved security and access measures.

Alternatives Analyzed: The Navy identified five action alternatives that accommodated the elements presented above for the Proposed Action.

Alternative 1 (Preferred Alternative): Alternative 1 will best meet NPTU's mission and needs presented above. When compared to the other alternatives, this one: 1) includes a shorter pier that minimizes effects for overwater shadowing, shortens period for pile driving, and reduces the pier construction footprint; 2) meets blast arc safety criteria by not building a multi-level parking facility; and 3) best meets the need to accommodate the incoming new MTSs and the increased student load. The Preferred Alternative would include: construction of two training, academic, administrative and support facilities (TSB 2 and TSB 2A); a 300-foot expansion of existing Pier X-Ray North to support the newer MTSs; increase the number of parking spaces to accommodate 1,900 total parking spaces by clearing of forested areas; upgrade existing utilities including adding an alternate power supply line, and upgrade infrastructure and security at NPTU. Demolition of an existing 2,500 square-foot storage and handling facility (Building 43) and parking spaces will also occur under this preferred alternative. Temporary vessel stabilization piles may be used during the construction of the pier for equipment positioning and movement.

Alternative 2: This alternative includes the infrastructure improvements and expansion identified in the Proposed Action and alternative 1; however, this alternative would include the construction of a multi-level parking structure to accommodate up to 500 vehicles and paved areas to support 1,400 parking spaces.

Alternative 3: This alternative includes the infrastructure improvements and expansion identified in the Proposed Action; however, this alternative would include a longer pier extension of 480 feet to accommodate a bow-to-stern configuration of the new MTSs and accommodate the 1,900 parking spaces by clearing forested areas.

Alternative 4: This alternative includes the infrastructure improvements and expansion identified in the Proposed Action; however, this alternative requires the longer pier extension and involves a bow-to-stern configuration for the new MTSs which would require a pier extension of 480 feet and would provide the 1,900 parking spaces by the construction of a multi-level parking structure for up to 500 vehicles and paved areas of 1,400 parking spaces.

Alternative 5: This alternative includes the infrastructure improvements and expansion identified in the Proposed Action; however, TSB 2A would not be built, Building 43 would not be demolished, and the IX-516 barge would move to a new berth established at Pier X-Ray South.

Alternative 6 (No Action Alternative): This alternative represents current conditions and is used as a basis to compare and analyze impacts. Under the no-action alternative, the current NPTU facilities would remain unchanged. However, the long-term, 50-percent increase in student throughput at NPTU Charleston would still occur and the two replacement S6G MTSs would arrive as scheduled.

Environmental Consequences: The NPTU Charleston Facilities Expansion EA provides analyses of the potential environmental consequences resulting from implementing the Proposed Action and alternatives. Eleven resource categories were thoroughly analyzed to identify potential impacts. According to the analysis in this EA, implementation of the Proposed Action with the prescribed mitigation will have no potential for significant direct, indirect, or cumulative impacts to any environmental resource category or significantly affect conditions at JB CHS. The following is a summary of the EA findings.

Land Use and Coastal Zone Management: The Preferred Alternative will have minor impacts to lands in the vicinity of NPTU Charleston. The Preferred Alternative will develop up to 8 acres of undeveloped land (of which up to 7 acres are wetlands) and 10 acres of developed land to create parking areas and will change the land use classification from undeveloped to training. Facilities will be sited to take maximum advantage of previously disturbed areas. Because NPTU Charleston is a shore-side facility, all construction will occur within the coastal zone of South Carolina. Minor, short-term impacts from disturbance due to construction activities could occur. Long term impacts to wetlands will also occur, with the Preferred Alternative impacting up to 7 acres of wetlands (see Water Resources, below); however, these impacts will be mitigated through the purchase of wetland credits. Current estimates are that 10 credits would be purchased for each acre impacted, for a total of about 70 credits. Wetland credits will be purchased from a U.S. Army Corps of Engineers (USACE) approved wetland mitigation bank (Pigeon Pond has been identified as a local mitigation bank with available credits). The specific number of credits and the bank location will be finalized once designs are completed and the permitting process with USACE accomplished.

Implementation of the Preferred Alternative will be consistent to the maximum extent practicable with the enforceable policies of South Carolina's coastal zone management program. A Federal Consistency Determination was submitted to the South Carolina Ocean and Coastal Resource Management (OCRM) office on February

23, 2012. The OCRM Office response concurred with the determination in their letter of April 23, 2012 and is included with the Final EA Appendix C. Under the No Action Alternative, no construction would occur; Land Use and Coastal Zone Management will not be significantly impacted.

Geology, Topography, Seismology, and Soils: Under the Preferred Alternative, construction and demolition will not significantly impact underlying geology. Development will occur on predominately flat, previously disturbed areas that will be insignificantly impacted by preconstruction fill activities. Construction within a seismically hazardous area could not be avoided. Seismic risk will not increase from existing conditions as facilities must be co-located with the MTSs. Temporary impacts to soils could occur during the construction phases of the Preferred Alternative. Additional impervious surface will increase long-term risk of erosion of soils, but will be minimized through the use of standard erosion and sedimentation control best management practices (BMPs). Under the No Action Alternative, there would be no construction or demolition; therefore there would be no impacts to geology, topography, seismology, or soils.

Biological Resources: Under the Preferred Alternative, long-term vegetation impacts will occur with the development of up to 8 acres of undeveloped land (up to 7 acres of which are wetlands) and 10 acres of developed land. However, given the abundance of nearby forest land, the impacts are considered to be insignificant in nature. Construction and demolition activities will not impact wildlife species at the population level, nor remove any unique habitat for terrestrial wildlife.

Dredging of the Cooper River for the channel adjacent to the NPTU piers is currently permitted by the USACE. Dredging during this project will not exceed permit limits.

Aquatic resources (essential fish habitat and aquatic life) will be impacted from pier expansion pile driving and dredging, and wetland filling activities. Pier expansion could cause temporary impacts to aquatic life primarily from sound generated from pile driving and MTS anchor system installation. This will represent a short-term impact due to underwater noise and turbidity.

To avoid adverse noise effects generated by pile-driving activities, the Navy will not conduct in-water work in the Cooper River between October 1 and March 30; will undertake noise ramp-up procedures prior to pile-driving activities; will not drive piles prior to May 1; and only drive steel piles between June 15 and August 30.

Essential fish habitat is located in the open waters and bottom of the Cooper River, adjacent tidal creeks and salt marsh. A security fence will be extended into the salt marsh, but this wetland area would not be filled. Direct impacts to essential fish habitat will be mitigated by avoiding, to the extent practicable, wetland filling and dredging during spawning periods (March through June) and by designing the security fence to allow aquatic organisms to transit through or around the fence. The Navy will also ensure that a vegetated buffer of at least 75-feet is present between the adjacent estuarine emergent marsh and new parking areas and walkways to avoid adverse indirect impacts to essential fish habitat.

During pier construction, anchors and chains for two equipment barges and possibly mooring pilings, struts, or spuds for crane stabilization would be needed for about 5 months a year. Construction may need to occur over two, 5-month seasons. Pile driving may need to occur for a total of 6 to 8 months depending on the number of piles that can be driven in each 5-month window (due to weather delays, etc.). These activities would introduce temporary overwater shading, a short-term increase in turbidity, and a minor temporary bottom impact from the anchors, chains, and moorings. These short-term, temporary impacts would not incur adverse or significant impacts to aquatic life.

The Navy determined that no adverse impacts to marine mammals are likely when identified avoidance measures are implemented as described in the Marine Mammal Observer (MMO) Plan. The MMO Plan outlines the procedures for monitoring and reporting activities in the project area during pile driving. These procedures will be included and adhered to as prescribed in the Mitigation Plan developed for this proposal.

The USFWS concurred on March 20, 2012, with the Navy determination that the preferred alternative may affect, but is not likely to adversely affect manatees from in-water construction activities, because Standard Manatee Guidelines will be followed. The Navy will adhere to these Guidelines as well as to the MMO Plan to avoid adverse effects to manatees.

The NMFS concurred on August 31, 2012, with the Navy conclusion that the preferred alternative may affect, but is not likely to adversely affect shortnose and Atlantic sturgeon with implementation of the Mitigation Plan.

The Navy also determined that no takes to sea turtles and smalltooth sawfish are likely since they are not expected to occur in the action area. However, as a precautionary measure, the Navy will adhere to Sea Turtle and Smalltooth Sawfish Construction Conditions provided by NMFS and trained marine mammal observers to avoid potential adverse impacts.

Overwater shadowing, when compared to existing conditions will be decreased with the implementation of the Preferred Alternative due to the removal of support barges for the MTSs. Under the No Action Alternative, there would be no impacts to biological resources, as baseline conditions would persist.

Water Resources: Implementation of the Preferred Alternative will require permanent loss of up to 7 acres of wetlands; however, this loss will be mitigated through the purchase of wetland credits (specific wetland credit numbers and wetland mitigation bank location will be finalized once designs are completed during the USACE permitting process). A formal mitigation plan noting mitigation details will also be finalized before construction activities begin. Permitting of these actions with the USACE and South Carolina Department of Health and Environmental Control will be completed prior to construction activities. All required mitigation and impact minimization protocols laid out in the wetland permit process will be implemented by the Navy. Construction within the 100-year floodplain is unavoidable due to the need to be co-located with the MTSs, and will involve 18 acres of development within the 100-year floodplain (10 acres of previously developed land and 8 acres of undeveloped land).

Impacts to groundwater will be minor, and impacts to water quality will be minimized through the use of standard construction BMPs for minimizing soil erosion and any other potential contamination from construction activities. Storm water will be managed through the design and implementation of standard storm water engineering controls, such as gutters and culverts directing flows to detention areas. All required storm water protection measures, BMPs, and minimization efforts will be undertaken to limit impacts from runoff. The newer MTSs and the temporary addition of a third MTS at NPTU Charleston during the peak transition time (FY 2020 - 2022) would slightly increase the thermal discharge into the Cooper River from baseline. This increase is estimated to be 0.09 degrees Fahrenheit, well below the regulatory limit of 1.5 degrees Fahrenheit and within the current mixing zone authorized under the South Carolina water discharge permit. The addition of the third MTS will be coordinated through revision of the existing permit with the State. Under the No Action Alternative, no construction activities would occur; however, the larger thermal discharge from the newer MTSs would still occur.

Socioeconomics: The Preferred Alternative will increase annual student throughput and associated staffing to accommodate increased student loading at NPTU Charleston. The peak of student/staff loading will occur during Fiscal Year 2020 (FY 2020) to FY 2022, when up to an additional 1,443 personnel would be at NPTU Charleston. The end state loading will be slightly less, with up to an additional 572 personnel, as compared to the baseline of at least 1,862. No students will be housed at NPTU Charleston, but the local housing market has sufficient capacity to absorb the increased number of students and staff. Construction employment and increased local population will have both long-term and short-term beneficial impacts to the local economy. Under the No Action Alternative, beneficial impacts from construction would not occur. Increased student and staff loading would still occur, but there would be sufficient housing stock to absorb the increased demand. There would be no disproportionate impacts to low income or minority populations and no increased safety or health risks to effect children. Navy will follow all applicable orders, laws, and regulations in facility design and construction to ensure provision for the handicapped; therefore, no impacts are anticipated.

Cultural Resources: No adverse effects on cultural resources are anticipated. The South Carolina State Historic Preservation Officer (SHPO) concurred that no properties listed in or eligible for listing in the *National Register of Historic Places* would be affected by the Proposed Action. If cultural resources are discovered during construction activities, the South Carolina SHPO will be consulted. Pursuant to 43 CFR 10, federally recognized Native American Tribes will be consulted if any "cultural items" subject to the provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) are suspected or identified.

Transportation: The Preferred Alternative will increase the local population with a peak addition of up to 1,443 personnel to the current baseline of at least 1,862. When the shift work nature of NPTU Charleston is taken into account, the increase in traffic becomes an additional 117 vehicle trips on-base daily, during the student loading peak (FY 2020 - FY 2022). Though traffic is already an issue at the JB CHS-W gates and on the local roadways, the addition of 117 vehicles in the long-term will represent a minor impact; however, to alleviate potential traffic issues when there are three MTSs operating, the Navy will stagger shifts to lessen congestion.

The piers at NPTU Charleston parallel the Cooper River federal navigational channel. Pier construction will not encroach further into the navigational channel, but the existing port security barrier could expand up to 270 ft to the north, parallel to the channel, causing no long-term impacts to navigation. During pier construction, some short-term impacts to navigation may occur due to moving of construction equipment into the area by barge. However, the Navy will coordinate with the US Coast Guard through their Notice to Mariners and by contacting Cooper River users to minimize any delays to passage.

Public Health and Safety: The Preferred Alternative will require construction and demolition and could expose workers and personnel to construction related risks. However, the Proposed Action does not pose any unique or novel public health and safety risks. Facilities will be constructed within the explosives safety quantity distance arc of Wharf Alpha, located south of the NPTU facility. Due to the location of facilities, all construction would be done per Department of Defense regulations to ensure worker and personnel safety while within the safety arcs. There will be no impacts to public health and safety. Under the No Action Alternative, no construction would occur; therefore, no impacts to public health and safety would occur.

Hazardous Materials and Waste: No adverse impacts will be expected under any alternative, since no new waste streams will be created. Examination for asbestos-containing materials and lead based paint will occur prior to any facility demolition. Any such materials discovered will be controlled and disposed of according to regulations. Within the footprint of the proposed action, site AOC G is identified in the JB CHS-W Resource Conservation and Recovery Act (RCRA) Part B Permit as Southside Wastewater Treatment Facility. Any physical alterations that might impact AOC G would be accomplished in accordance with Part B Permit requirements. Under the No Action Alternative, the Navy would not implement facility construction or building modifications or demolition; no changes to hazardous materials, hazardous waste, or solid waste resources would be expected with implementation of the No Action Alternative.

Infrastructure and Utilities: No adverse impacts to infrastructure and utilities will occur with implementation of the Preferred Alternative. Adequate capacity for public services, communications, energy needs, and potable and wastewater services exist; however, upgrades to the electrical supply will be needed to add supply and an alternate power line along existing utility corridors on JB CHS-W. Disposal of construction and demolition debris and a small increase in solid waste generation resulting from increases in staffing and students will be handled pursuant to the applicable federal, state and local laws. There is sufficient capacity at existing landfills in the vicinity of JB CHS-W to adequately accommodate the quantities estimated for the Proposed Action.

Radiological Aspects of Nuclear-Powered Moored Training Ships: The Naval Nuclear Propulsion Program provides comprehensive technical management of all aspects of the naval nuclear propulsion plant design, construction, and operation including careful consideration of reactor safety, radiological, environmental and emergency planning concerns. Radiological aspects of operating MTSs will continue to have no discernible effect on human health or the quality of the environment.

Cumulative Impacts*:* The following resources were evaluated for cumulative effects: land use and coastal zone management; geology, topography, seismology, and soils; biological resources; water resources; socioeconomics; cultural; transportation; public health and safety; toxic substances, hazardous materials, and waste; infrastructure and utilities and radiological aspects. Other past, present, and foreseeable actions in the Region of Influence were analyzed in the EA. The results of the analysis in the EA indicated that there would be no significant cumulative effects to the physical, biological, or socioeconomic environments caused by implementation of any of the proposed action alternatives.

Practicable Alternatives*:* There are no practicable alternatives to filling the wetland for parking. The alternatives of a multi-story parking facility and off-site parking fail to meet the selection criteria concerning cost, safety, and operation. Student training is conducted with small classes, staggered over a 24-hour period, 7 days a week. Students and staff require commuting flexibility. Alternatives such as carpooling, or base transportation would not support the operational mission. Distant parking requiring students and staff to walk at night along unlighted routes is unsafe. Construction of a multi-level parking structure would require design in accordance with explosive blast arc standards and is cost prohibitive regarding construction and maintenance. Alternative 1 (Preferred Alternative) best meets the Navy's needs by providing the necessary infrastructure improvements while minimizing costs and encroachment along the navigation channel.

Public Review and Comment: The NEPA process is designed to involve the public in the federal decision-making process. Formal notification and opportunities for public participation were provided during the preparation of this EA. Formal and informal coordination and consultation with government agencies and planners was also conducted.

The Draft EA and the Draft FONSI/FONPA were provided to federal, state, and local officials and other interested parties as identified in Appendix A of the EA. The Draft EA and the Draft FONSI/FONPA were made available for public review during 30-day comment periods at the Dorchester Road Regional Library in North Charleston, South Carolina, the Naval Support Activity Branch Library in Goose Creek, South Carolina and on the Naval Facilities Engineering Command Southeast public website. All relevant comments from the public and government agencies were addressed in the Final EA and this FONSI/FONPA.

Findings of No Significant Impact: On the basis of the facts and analyses of the NPTU Charleston Facilities Expansion EA, conducted in accordance with the requirements of NEPA, CEQ regulations 40 CFR 1500, Navy requirements 32 CFR 775 and Air Force requirements 32 CFR Part 989, and after careful review of the potential environmental impacts and mitigation actions of implementing the NPTU facilities expansion, the Navy as the lead agency with cooperation from the Air Force finds that there will be no significant impact on the quality of the human or natural environment, either individually or cumulatively with the Preferred Alternative. For these reasons, the preparation of an Environmental Impact Statement is not warranted.

Findings of No Practicable Alternative: Pursuant to Executive Order 11988, *Floodplain Management*, as incorporated by Navy and Air Force regulations and the written redelegations accomplished pursuant to this order, and in taking the above information into account, we find there is no other practicable alternative to implementing the Proposed Action within the floodplain and that the Proposed Action includes all practicable measures to minimize harm to the floodplain environment. In accordance with

FINDING OF NO SIGNIFICANT IMPACT (FONSI) AND FINDING OF NO PRACTICABLE ALTERNATIVE (FONPA) FOR THE ENVIRONMENTAL ASSESSMENT (EA) FACILITIES EXPANSION AT THE NAVY NUCLEAR POWER TRAINING UNIT CHARLESTON, JOINT BASE CHARLESTON, BERKELEY COUNTY, SOUTH CAROLINA

Executive Order 11990, *Protection of Wetlands* authority incorporated into Navy and Air Force regulations and the written redelegations accomplished pursuant to the order, we find that there is no practicable alternative to implementing the Proposed Action within wetlands, and the Proposed Action includes all practicable measures to minimize and mitigate impacts to wetlands and endangered species to insignificance.

The NPTU Facilities Expansion EA prepared by the Navy in cooperation with the Air Force addressing this action is on file and interested parties may obtain a copy from: NAVFAC SE; Box 30, Bldg 903; NAS Jacksonville, FL 32212-0030; Attention: Thomas A. Currin, Code EV21.

K. H. DONALD Admiral, USN Director, Naval Nuclear Propulsion	31 OCT 12 Date	ROBERT R. ALLARDICE Lt General USAF Vice Commander, AMC	25 Oct 12 Date

Acronyms and Abbreviations

ABA	Architectural Barriers Act
ACM	Asbestos Containing Material
ACRS	Advisory Commission on Reactor Safeguards
ADA	Americans with Disabilities Act
AEC	Atomic Energy Commission
AFM	Air Force Manual
AOC	Area of Concern
APS	Air particulate sampler
AST	Above Ground Storage Tank
ATFP	Anti-Terrorism Force Protection
BCD	Berkeley-Charleston-Dorchester
BCW&SA	Berkeley County Water and Sewer Authority
Bldg	Building
BMP	Best Management Practice
C&D	Construction and Demolition
CAA	Clean Air Act
CCSD	Charleston County School District
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CHATS	Charleston Area Transportation Study
CHS	Charleston
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CWA	Clean Water Act
cy	cubic yard
CZMA	Coastal Zone Management Act
DO	Dissolved Oxygen
DoD	Department of Defense
DOE	Department of Energy
DoN	Department of the Navy
DOT	Department of Transportation
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
F	Fahrenheit
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
ft	feet
FY	Fiscal Year
GAO	General Accounting Office
GHG	Greenhouse Gas
gpd	Gallons per Day
HEPA	High-efficiency particulate air
IDE	Interactive Display Equipment
JB	Joint Base
KV	Kilovolt
LBP	Lead Based Paint
lbs	pounds
LEED	Leadership in Energy and Environmental Design
LID	Low-Impact Development
mgd	million gallons per day
mph	miles per hour
MSL	mean sea level
MTS	Moored Training Ship
NAAQS	National Ambient Air Quality Standards
NAVFAC	Naval Facilities Engineering Command
NCRPM	National Council of Radiation Protection and Measurement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NNPP	Naval Nuclear Propulsion Program
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge and Elimination System
NPTU	Nuclear Power Training Unit
NRC	Nuclear Regulatory Commission
NY	New York
OCRM	Ocean and Coastal Resource Management
OPNAVINST	Chief of Naval Operations Instruction
PCB	Polychlorinated Biphenyl
PL	Public Law
PSB	Port Security Barrier
RCRA	Resource Conservation and Recovery Act
RCW	Red-cockaded Woodpecker
Rd	Road
rem	roentgen equivalent man
ROI	Region of Influence
SA	Saltwater A
SB	Saltwater B
SC	South Carolina
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCEEP	South Carolina Earthquake Education Program
SCE&G	South Carolina Electric and Gas
SCR	South Carolina Regulation
sf	square feet
SO_x	Sulfur Oxides
SSBN	Submersible Ship, Ballistic, Nuclear Powered
SSN	Submersible Ship, Nuclear Powered
SMWU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TSB	Training Support Building
TSCA	Toxic Substances Control Act
UFC	Unified Facilities Code
US/U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USS	U.S. Ship
UST	Underground Storage Tank

EXECUTIVE SUMMARY

The United States Navy (Navy) has prepared this environmental assessment (EA) to assess potential impacts from proposed infrastructure improvements needed to accommodate both the current, as well as the anticipated increase of student numbers at the Nuclear Power Training Unit-Charleston (NPTU Charleston), Joint Base Charleston, Weapons (JB CHS-W), South Carolina (SC). NPTU Charleston proposes to alleviate current overcrowding, accommodate increased student throughput (with associated increase in NPTU staff), provide facilities for transitioning to newer moored training ships (MTSs), allow for uninterrupted student training during MTS transition, and ensure all facilities meet Department of Defense, Navy, and Air Force security requirements. To accomplish this, the Proposed Action would: demolish, renovate, and upgrade existing facilities and infrastructure; construct academic and training facilities; relocate MTS support systems; increase the number of parking spaces; expand pier facilities to support uninterrupted MTS operation and training during the transition to the newer MTSs; and implement improved security and access measures.

Using defined criteria, the Navy identified five action alternatives that best accommodated the elements presented above for the Proposed Action. Alternative 1 (the preferred alternative) would best meet NPTU's mission and accommodate the needs presented above. This alternative includes: construction of two training, academic, administrative and support facilities; a 300-foot expansion of existing Pier X-Ray North to support the newer MTSs; increase the number of parking spaces; upgrade existing utilities and infrastructure; increase electrical capacity and add alternate electrical supply power lines to prevent site power loss in the event of an emergency; and better existing security at NPTU by establishing a new and separate security gatehouse, building a new security tower at Pier X-Ray North, replacing existing on-land security fencing, and extending current in-water Port Security Barrier to accommodate the new MTSs and expanded pier. Demolition of an existing 2,500 square-foot storage and handling facility and parking spaces would also occur under this preferred alternative. The four other action alternatives include variations of Alternative 1.

This EA presents the impact analyses for the five action alternatives and no-action alternative. The effects of these alternatives are discussed in regard to land use and coastal zone management; geology, topography, seismology, and soils; biological resources; water resources; socioeconomics; transportation; public health and safety; hazardous materials and waste; infrastructure and utilities; and nuclear and radiological aspects. Adverse, significant impacts to certain resources are being avoided by:

- applying permit-required wetland mitigation measures, such as purchasing wetland bank credits at U.S. Army Corps of Engineers' permit-specified ratios,
- following the Standard Manatee Guidelines and implementing a marine mammal observer plan,
- avoiding in-water work from October through March,
- ensuring a 75-foot vegetated buffer between emergent estuarine marshes and new parking areas and pedestrian walkways, and
- avoiding dredging and filling during fish spawning periods.

There were no other impacts that would be adverse or significant when considered by themselves or cumulatively with other past, present, or reasonably foreseeable A Draft EA was provided to the federal, state, and local agencies and the public on February 15, 2012. The Draft EA was updated to address comments received, clarify information, and update project requirements based on ship length and NPTU power needs. The Final EA was updated to address all comments received and reflects the completion of consultations with agencies.

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CHAPTER ONE: PURPOSE OF AND NEED FOR PROPOSED ACTION

1.1 INTRODUCTION

The United States Navy (Navy) has prepared this environmental assessment (EA) to assess potential impacts from proposed infrastructure improvements needed to accommodate current, as well as anticipated increase of student numbers at the Nuclear Power Training Unit-Charleston (NPTU Charleston), South Carolina (SC). The NPTU is located in Berkeley County, along the Cooper River (Figure 1-1), on Joint Base Charleston. Joint Base Charleston is composed of two major enclaves, one being the airfield denoted as Joint Base Charleston – Air (JB CHS-A); the other being the former Naval Weapons Station, now denoted as Joint Base Charleston – Weapons (JB CHS-W), as shown in Figure1-1.

As stated in Title 10 United States (U.S.) Code (U.S.C.) § 5062, the Navy's mission is to maintain, train, and equip a combat-ready Naval force to win wars, deter aggression, and maintain freedom of the seas. To meet this mission, the Navy needs highly qualified personnel to operate its nuclear powered fleet of 11 aircraft carriers, 71 commissioned submarines, and 4 training platforms (NNPP 2011a). It is NPTU Charleston's mission to provide prospective Naval nuclear propulsion plant operators and officers with training and certification in the actual, hands-on operation of a nuclear propulsion plant. Training at NPTU Charleston consists of 6 months of practical instruction on an operating Naval nuclear reactor plant, under strict supervision of qualified Navy, civilian, and other government personnel. To meet deployment to Naval nuclear-powered ships and submarines, annual student throughput (or the total number of students trained over a year) at NPTU Charleston is approximately 1,200. The current on-shore NPTU training campus consists of a Training Support Building (TSB); a shipping/receiving building (Bldg); and parking lots. Along the shore of the Cooper River, the training facility includes two piers: X-Ray North (with a finger-pier) and X-Ray South; two Moored Training Ships (MTS 626 and MTS 635); two off-hull MTS support barges (YC-1596 and YFN-797); a command barge (YFNX-20); and a training support barge (IX-516) with classrooms, office space, and storage (Figure 1-2).

NPTU Charleston proposes to alleviate current overcrowding, accommodate increased student throughput (with associated increase in NPTU staff), provide facilities for transitioning to newer MTSs, allow for uninterrupted student training during MTS transition, upgrade power utilities, and ensure all facilities meet Department of Defense (DoD), Navy, and Air Force security requirements. The proposed improvements would also allow for smooth transitioning from the current classes of MTSs to a newer class of MTSs. This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [C.F.R.] § 1500-1508), Navy NEPA procedures at 32 C.F.R. § 775, and Air Force Environmental Impact Analysis Process procedures at 32 C.F.R. § 989.

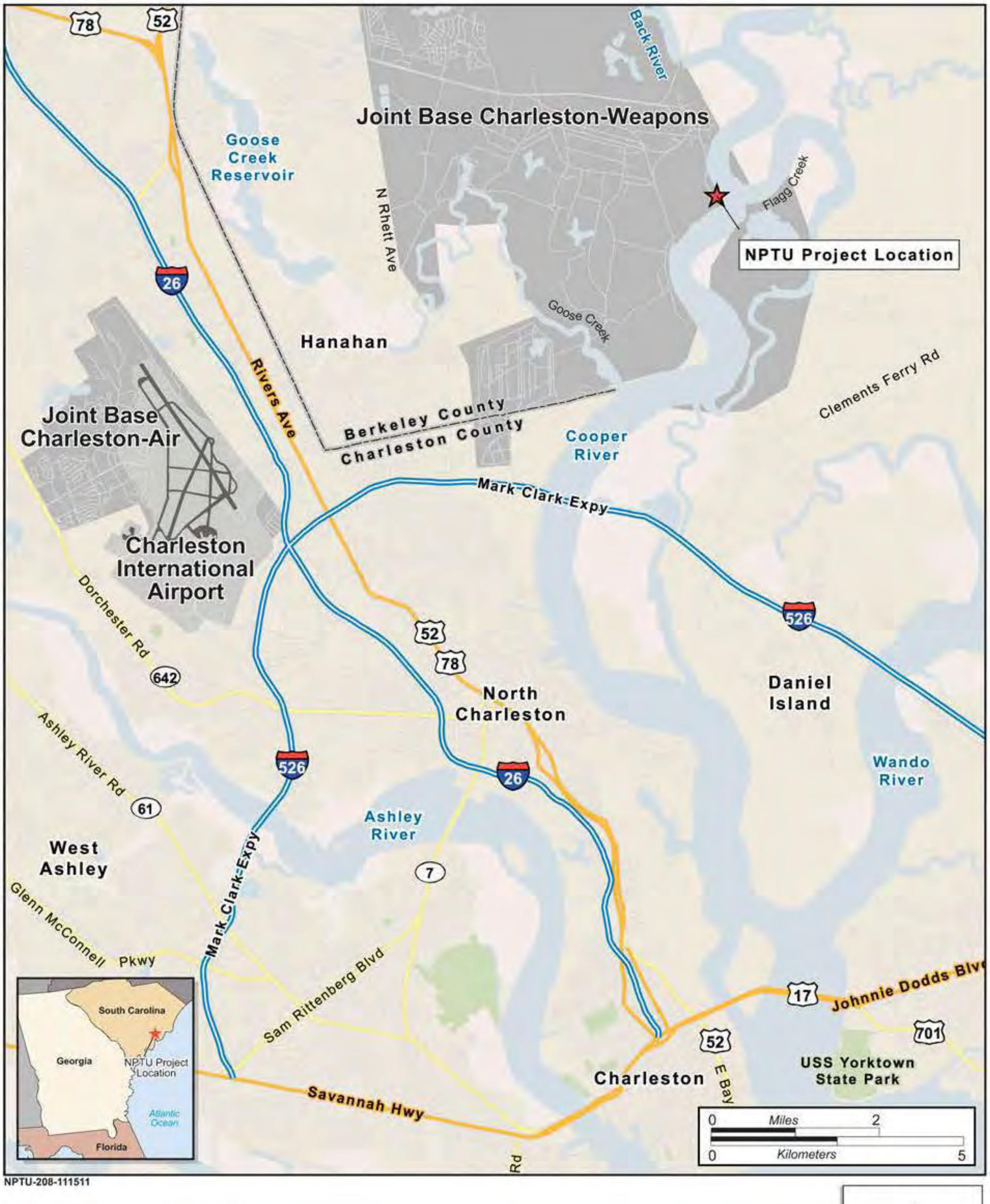

Figure 1-1 NPTU Vicinity Map

Figure 1-2 NPTU Existing Site Configuration

1.2 BACKGROUND

The Naval Nuclear Propulsion Program (NNPP) grew out of the development of atomic technologies at the close of World War II. In 1946, Congress established the Atomic Energy Commission (AEC) which was charged with the sole responsibility for developing and advancing atomic energy. At that time, U.S. Navy Captain (later Admiral) Hyman G. Rickover, who was assigned to the Navy Bureau of Ships, recognized the military implications of successfully harnessing atomic power for submarine propulsion. By 1949, Rickover had developed a solid relationship between the AEC and the Navy which led to the development of the NNPP (NNSA 2011).

In 1955, the nuclear submarine U.S. Ship (USS) NAUTILIS put to sea and demonstrated the basis for subsequent Navy nuclear-powered warship reactor designs. In the 1970s, government restructuring moved the NNPP from the AEC (which was disestablished) to what became the Department of Energy (DOE). Today the NNPP still retains its dual responsibility to the Navy and DOE but is the sole organization responsible for all matters pertaining to Naval nuclear propulsion pursuant to Presidential Executive Order (EO) 12344 (*Naval Nuclear Propulsion Program*), set forth in Public Law (PL) 98-525 (50 U.S.C. § 2511) and PL 106-65 (50 U.S.C. § 2406). The NNPP is responsible for all aspects of the Navy's nuclear propulsion, including research, design, construction, testing, operation, maintenance, ultimate disposition of naval nuclear propulsion plants, and the training and qualification of personnel as nuclear propulsion plant operators. This responsibility is cradle-to-grave in scope for all elements of Naval nuclear propulsion (NNSA 2011).

Research, development, and support services for the NNPP are provided by two government owned/contractor-operated research and engineering facilities: Bettis and Knolls Atomic Power Laboratories. These labs employ over 6,100 engineers, scientists, technicians, and support personnel whose goal is to provide the Navy with the most advanced Naval nuclear propulsion technology and technical support to ensure the continued safe, reliable operation of all existing Naval nuclear reactor plants (NNSA 2011).

The NPTU is a part of the training component of the NNPP. The NPTU meets the unique training needs of the NNPP through its specialized facilities and highly qualified technical instructors. The NPTU consists of classroom instruction facilities as well as nuclear reactor platforms. Currently, the NNPP has four reactor training platforms. Two land-based platforms are located at NPTU Ballston Spa in New York (NY) and two MTS platforms at NPTU Charleston (NNSA 2011). The MTSs were at one time ship-of-the-line commissioned Navy ballistic missile submarines that have been converted into training facilities. All weaponry and navigational systems have been removed, but the nuclear reactor plants remain on board and are used for hands-on training. Nuclear operator training is typically split evenly between the Ballston Spa and Charleston NPTU facilities, each having an annual throughput of approximately 1,200 students. However, temporary increases in the throughput occur at each site to accommodate training pauses at the other site during nuclear propulsion plant maintenance periods

1.2.1 Student and Staff Loading

NPTU Charleston currently trains and certifies about 50 percent of all Naval nuclear propulsion plant operators and officers. However, over the next 10 years, training throughput at NPTU Charleston will increase. By Fiscal Year 2018 (FY18) NPTU Charleston training facilities will be inadequate to train the number of students required. From FY11 to FY17, NPTU Charleston will experience a 25-percent increase in student loading (300 additional students annually) from 1,200 to a total of approximately 1,500 students per year. From FY18 to FY19 there will be a need to train additional Naval nuclear propulsion enlisted personnel and officers at NPTU Charleston; starting in FY19, one training platform at NPTU Ballston Spa will be deactivated, thus requiring the need to train a total of about 2,000 students annually at NPTU Charleston. From FY20 to FY22, the number of students surges to 2,800 because the remaining training platform at NPTU Ballston Spa will be refueled and all student training will need to take place at NPTU Charleston. NPTU Charleston must temporarily accommodate 2,800 students per year until the refueling is complete. While this surge of 2,800 students is temporary, NPTU Charleston will need to accommodate a long-term capacity to train approximately 1,800 students per year starting in FY22. About 90 percent of the students are and will be enlisted (E) at the E-4 rank; the remaining 10 percent are officers (O) at the O-1 and O-2 rank.

At NPTU Charleston, assigned Navy and civilian staff (including executives, managers, professional instructors/trainers, technicians, and administrative personnel), as well as students currently number approximately 1,862. Only a portion of the students that are trained annually are assigned to NPTU Charleston at any time. Students, staff, and civilian personnel live off Station and vary in rank and/or professional levels. These totals include all personnel assigned to the NPTU; however, not all of the students and staff members are on site at any one time due to staggered shift work schedules. The shift work supports operations which occur 24 hours per day, 7 days a week, 365 days a year. Table 1-1 provides the number of assigned NPTU Charleston students and staff by category, and the maximum number anticipated on site at NPTU facilities during a 24-hour period. Estimates are provided under baseline conditions, during the peak of transition, and then what is anticipated in the long term—once the transition is completed. During MTS transition, total assigned students and staff will increase to approximately 3,305 from a baseline of 1,862. In the long term, assigned students and staff are expected to total approximately 2,434; an increase of 572 from baseline conditions of 1,862.

Table 1-1 NPTU Charleston Assigned Personnel and Maximum On-Site Numbers for Baseline, Peak Transition, and Long Term

Category	Baseline		Peak Transition		Long Term		Net Long Term Change Compared to Baseline	
	Total Assigned	*Maximum On Site*	*Total Assigned*	*Maximum On Site*	*Total Assigned*	*Maximum On Site*	*Total Assigned*	*Maximum On Site*
Students	840	620	1,587	1,171	1,122	828	+282	+208
Navy Staff	754	532	1,321	917	1,001	700	+247	+168
Civilian Staff	268	230	397	349	311	275	+43	+45
TOTAL	**1,862**	**1,392**	**3,305**	**2,437**	**2,434**	**1,803**	**+572**	**+411**

1.2.2 Outdated Facilities

To keep the nuclear fleet poised and ready, the NTPU must utilize newer technology and training platforms for their nuclear operators and officers. Replacement of the aging MTS training platforms is a crucial component in meeting fleet training requirements. The existing MTSs at NPTU Charleston are nearing the end of their operational lifespan. Replacement of the older S5W MTSs (the S5W designation indicates that the reactor is for a submarine [S]; is a fifth generation reactor core [5]; and the design organization, Westinghouse [W] or General Electric [G]) with newer S6G submarines, ensures that students are trained on Naval nuclear propulsion reactors in use in the Fleet.

The two MTSs currently moored at NPTU Charleston are MTS 626 (formerly the USS DANIEL WEBSTER, Submersible Ship, Ballistic, Nuclear Powered [SSBN] 626) and MTS 635 (formerly the USS SAM RAYBURN, SSBN 635), both powered by S5W nuclear propulsion plants. These two submarines were developed in the 1960s and commissioned in 1964. The SSBNs mission was strategic deterrence. They were built for extended deployment and served as an integral part of the Navy's presence during the Cold War. The USS SAM RAYBURN was decommissioned in 1989, and the USS DANIEL WEBSTER was decommissioned in 1993; both had missile compartments and other weapons systems removed and were converted into MTSs in the late 1980s to early 1990s (NNPP 2011a, DoN 2011a, b).

As was mentioned above, the S5W MTSs will be replaced by S6G MTSs. The two ships that are scheduled for decommissioning and conversion to MTSs are the USS LA JOLLA (Submersible Ship, Nuclear Powered [SSN] 701) and USS SAN FRANCISCO (SSN 711) both actively deployed in the Fleet. Both ships use a newer generation S6G nuclear propulsion plant, were commissioned in 1981, and are almost 20 years newer than the MTSs they are replacing (DoN 2011a, b). SSN 701 and SSN 711 will be designated MTS 701 and MTS 711 after they are converted to training platforms.

Another critical component of training with newer technology and assisting with student throughput is the use of Interactive Display Equipment (IDE), or simulators. Currently, the NPTU operates only two S5W maneuvering room IDEs. The existing maneuvering room IDEs would be replaced with ones appropriate for an S6G. Two watchstation IDEs would be added to provide new engineering space training simulators to support the increase in student training throughput.

Along with the MTSs, the support and command barges are reaching the end of their service life. Currently, they are moored at the piers and provide space for classrooms, storage, and propulsion plant support; however, they will not have sufficient capacity to support the new MTSs. In addition, since these barges are moored, they must be secured during hurricane events (causing training down time) and require periodic dry-dock maintenance (again causing training down time). By relocating these functions to on-shore facilities, less training down time will occur; a cost savings will also be realized by reducing the effort to maintain these outdated off-hull MTS service facilities.

1.2.3 Security

The NPTU Charleston personnel and visitor security check point and on-shore security fence do not meet the Anti-Terrorism Force Protection (ATFP) minimum requirements for all DoD facilities (Unified

Facilities Code [UFC] 4-010-01, change 1). In addition, the shoreline fence must be expanded to meet Chief of Naval Operations Instruction (OPNAVINST) 5530.14C and Air Force Manual (AFM) 91-201 requirements to provide a continuous barrier after additional shore facilities are constructed. The Port Security Barrier (PSB) currently meets ATFP requirements, but the PSB must be modified to provide the required separation distance to all MTSs during and after the transition to the replacement ships. In addition, the staging area for vehicle inspections entering the NPTU Campus requires upgrading.

1.2.4 Parking

Currently, NPTU Charleston has close to 1,040 parking spaces; however, an expansion of parking is needed to support ATFP standoff distances and new infrastructure development (which removes about 490 spaces), as well as to accommodate additional students and staff.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The **purpose** of the Proposed Action is to provide infrastructure to support the increase in student throughput and the newer MTS design. This action will be accomplished by increasing the number of training classrooms and office spaces; providing space for training system upgrades and new IDE simulators; consolidating MTS support systems (currently provided on multiple, specially configured barges) in an on-shore facility; providing increased pier-side MTS berthing to accommodate newer MTSs and to allow the transition to the newer MTSs without impacting training; and providing an increase and replacement of parking areas. The **need** for the Proposed Action is to ensure that NPTU Charleston's mission of providing highly qualified nuclear operators and supervisors for the Naval nuclear-powered Fleet is accomplished. NPTU's mission is to provide enough trained and certified operators to meet the Fleet's Naval nuclear operator manning requirements. If NPTU Charleston does not meet this demand, then nuclear-powered warships, which comprise 45 percent of the Navy's major combatants, will not be sufficiently staffed with trained reactor plant operators and officers to perform missions vital to national security.

Specifically, NPTU Charleston must be able to:

- Support current, ongoing Navy efforts to increase overall Naval nuclear fleet operators by 25 percent;
- Accommodate temporary increases in student throughput due to maintenance at NPTU Ballston Spa;
- Provide the facilities to support the long-term, increase in student loading and associated increase of training, instructional, and support staff by FY18;
- Accommodate transition from two S5W MTS nuclear platforms to two S6G MTS platforms, one in FY17 and the other in FY19 without interrupting on-going training;
- Accommodate increased electrical loads and provide alternate electrical power supply lines to reduce the probability of losing site power;
- Provide training in a professional, academic setting that can accommodate increased student throughput; and
- Improve site security features to meet applicable ATFP, Navy, and Air Force requirements.

1.4 THE ENVIRONMENTAL REVIEW PROCESS

1.4.1 The National Environmental Policy Act

NEPA requires consideration of environmental issues in federal agency planning and decision making. Under NEPA, federal agencies must prepare an EA or Environmental Impact Statement (EIS) for any major federal action, except those actions that are determined to be “categorically excluded” from further analysis. An EA is a concise public document that provides sufficient analysis for determining whether the potential environmental impacts of a Proposed Action are significant, resulting in the preparation of an EIS; or if not significant, resulting in the preparation of either a Finding of No Significant Impact (FONSI) or FONSI/Finding of No Practicable Alternative (FONPA). An EIS is prepared for those federal actions that may significantly affect the quality of the human and natural environment.

The intent of this EA is to assess the potential environmental impacts from implementing the Proposed Action, several alternatives, and a No Action Alternative at NPTU Charleston. The Navy is the decision maker; however, as a supported command at JB CHS-W, this EA conforms to both Navy and Air Force NEPA processes. The Navy is the lead agency and the Air Force is a cooperating agency. Any decisions based on the EA will be signed by both the Navy and the Air Force.

This EA has been prepared pursuant to CEQ regulations, as defined in 40 C.F.R. § 1500 to 1508, which direct federal agencies on how to implement the provisions of NEPA, as well as 32 C.F.R. § 775 (Navy) and 32 C.F.R. § 989 (Air Force) procedures and directives, which document the Navy and Air Force internal operating instructions on how they implement the provisions of NEPA.

1.4.2 Decision to be Made

Based on the analysis in this EA, the Navy and Air Force will decide:

1) The Proposed Action or alternatives can be executed with no significant environmental impacts and sign a FONSI and/or FONSI/FONPA; or
2) To initiate preparation of an EIS if the Proposed Action or alternatives would result in significant environmental impacts.

1.4.3 Public Scoping

In accordance with applicable regulations and policies, the Navy sent letters (thus initiating the Air Force Interagency and Intergovernmental Coordination for Environmental Planning process [IICEP]) to potentially interested local, state, and federal stakeholders, as well as local, state, and national elected officials (Appendix A contains a list of recipients). The IICEP letter described the Proposed Action and alternatives and requested assistance in identifying potential issues that should be evaluated in the EA. Appendix A contains a sample copy of the interagency correspondence sent to federal and state agencies.

In addition, project consultation was initiated with federally recognized American Indian Tribes associated with JB Charleston. Copies of the consultation letters sent to American Indian Tribes are found in Appendix A.

In response to IICEP (Appendix A), the U.S. Army Corps of Engineers (USACE) noted that permits pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act will be required. A Jurisdictional Determination will also be needed from the Corps prior to any development. The U.S. Fish and Wildlife Service suggested avoiding and reducing the amount of fill to the maximum extent possible in wetlands and to mitigate (per U.S. Army Corps of Engineers Mitigation Guidelines) those wetland impacts that cannot be avoided. The U.S. Environmental Protection Agency (USEPA) Region 4 summarized the points they wished the EA to address. These ranged from the purpose and need to cumulative effects.

Responses from South Carolina agencies included the State Historic Preservation Office. They concurred with the Navy that based on the Area of Potential Effect, no properties listed in or eligible for listing in the National Register of Historic Places will be affected by this proposal. The Department of Health and Environmental Control (SCDHEC) had no comments at this time. The Department of Commerce also responded and found that they had no negative comments regarding the proposal. U.S. House of Representatives, Congressman Daning also responded to IICEP and expressed his support of the proposal (Appendix A).

In terms of project consultation, the Choctaw Nation sent a list of states and counties as their areas of interest and South Carolina was not among those listed. The United Keetoowah Band of Cherokee Indians noted that they had no objections to the referenced project (see Appendix A for copies of these responses).

1.4.4 Comments on the Draft EA

The Draft EA was issued for public comment on February 15, 2012 and has been revised to address comments received and update project information. During the comment period on the Draft EA, the Navy received comments from USEPA Region 4 concurring that the Navy covered the major concerns and that they understood that wetlands could not be avoided and that appropriate wetland credits will be purchased to offset any impacts. The National Marine Fisheries Service (NMFS) Habitat Conservation Division (HCD) recommended that an Essential Fish Habitat (EFH) assessment be included in the Final EA and NMFS Protected Resources Division (PRD) be consulted regarding federally threatened Atlantic and shortnose sturgeon species. Navy submitted a revised EFH assessment to NMFS HCD and consultations were completed on June 4, 2012. The Navy contacted PRD and provided additional information included in Appendix F. The Navy committed to mitigation measures outlined in Section 3.4.2.2 to avoid adverse impacts to EFH and Atlantic and shortnose sturgeon. The U.S. Fish and Wildlife Service highlighted the need to ensure the safety of West Indian manatees by following Standard Manatee Guidelines for water activities, but indicated that the project is not likely to adversely affect threatened and endangered species under their purview. A reporter representing the *Post and Courier* inquired by email requesting information about what happens to the MTSs and the core once decommissioned; these points are covered in the EA in section 3.11.

A draft FONSI/FONPA was issued for public comment based on the Draft EA on May 2, 2012. This Final EA reflects completion of consultations with regulatory agencies and addresses all comments to the Draft EA.

1.4.5 Difference Between the Draft and Final EA

As a result of public comments, completing a wetland survey, increased ship length for newer MTSs, updated power needs for newer facilities, and refining facility design the following changes have occurred since publication of the February 2012 Draft EA:

- Results of an updated wetlands survey and USACE Jurisdictional Determination confirmation letter are found in Appendix E.
- More detailed evaluation of EFH impacts was added and found in Appendix F.
- Sections 3.4.2.2 (Aquatic Resources) and 3.4.2.3 (Threatened and Endangered Species) have been revised to reflect EFH results and consultations with USFWS and NMFS.
- Mitigation measures agreed to during consultations are outline in a new Chapter 5.
- Further expansion of the Port Security Barrier would occur due to increased ship length of newer MTSs. This expansion would run parallel to the shoreline and would not encroach further into the navigation channel (see Figure 3.7-2) and would not create significant environmental impacts.
- Upgraded utility description and evaluation as a result of increased power needs for NPTU Charleston and the addition of alternate power supply lines on JB CHS-W (see section 3.10).
- A follow-up letter was sent (March 30, 2012) to NMFS RPD analyzing potential impacts to both sturgeon species.

1.4.6 Other NPTU NEPA Documents

- EA, Propulsion Training Facility Naval Weapons Station Charleston Berkeley County, SC. FONSI signed 1990. The EA evaluated the expansion of the NTPU facility including addition of a second MTS and the construction of a 68,000 square foot TSB-1 (DoN 1990).
- EA, Security Improvements at Pier X-Ray Naval Weapons Station Charleston, SC. FONSI signed January 2003. This EA evaluated emplacement of a Port Security Barrier around the MTSs and IX-516 support and training barge (DoN 2003).

1.5 REGULATORY COMPLIANCE

In accordance with CEQ NEPA regulations as well as Navy and Air Force instructions, this EA was prepared concurrently with actions required by other environmental laws, regulations, and EOs as outlined by environmental resource in Table 1-2. Applicable consultations were completed and are discussed herein.

Table 1-2 Major Federal Environmental Statutes, Regulations, and Executive Orders Applicable to Federal Projects

Environmental Resources	Statute, Regulation, or Executive Order
Air Quality	Clean Air Act of 1970 (PL 95-95), as amended in 1977 and 1990 (PL 91-604); USEPA, Subchapter C-Air Programs (40 C.F.R. § 52-99); and 40 C.F.R. § 61, National Emissions Standards for Hazardous Air Pollutants.
Noise	Noise Control Act of 1972 (PL 92-574) and Amendments of 1978 (PL 95-609); and USEPA, Subchapter G, Noise Abatement Programs (40 C.F.R. § 201-211).
Geology and Soils	National Pollutant Discharge Elimination System (NPDES) Construction Activity General Permit (40 C.F.R. § 122-124).
Water Resources	Federal Water Pollution Control Act of 1972 (PL 92-500) and Amendments; Clean Water Act (CWA) of 1977 (PL 95-217); NPDES Construction Activity General Permit (40 C.F.R. § 122-124); NPDES Industrial Permit and NPDES Municipal Separate Storm Sewer System Permit; CWA 40 C.F.R. § 112 Spill Prevention Control and Countermeasure; USEPA, Subchapter D-Water Programs (40 C.F.R. § 100-145); Water Quality Act of 1987 (PL 100-4); USEPA, Subchapter N-Effluent Guidelines and Standards (40 C.F.R. § 401-471); Safe Drinking Water Act of 1972 (PL 95-923) and Amendments of 1986 (PL 99-339); and USEPA, National Drinking Water Regulations and Underground Injection Control Program (40 C.F.R. § 141-149); Rivers and Harbors Act (30 U.S.C. § 403 et seq.).
Biological Resources	Migratory Bird Treaty Act of 1918; Fish and Wildlife Coordination Act of 1958 (PL 85-654); Sikes Act of 1960 (PL 86-97) and Amendments of 1986 (PL 99-561) and 1997 (PL 105-85 Title XXIX); Endangered Species Act (ESA) of 1973 (PL 93-205) and Amendments of 1988 (PL 100-478); Fish and Wildlife Conservation Act of 1980 (PL 96-366); Lacey Act Amendments of 1981 (PL 97-79); Magnuson-Stevens Fishery Conservation and Management Act of 1996 (PL 94-256); and Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186).
Wetlands and Floodplains	Section 401 and 404 of the Federal Water Pollution Control Act of 1972 (PL 92-500); USEPA, Subchapter D, Water Programs 40 C.F.R. § 100-149 (105 ref); Coastal Zone Management Act of 1972 (PL 109-58); Floodplain Management-1977 (EO 11988); Protection of Wetlands-1977 (EO 11990); Emergency Wetlands Resources Act of 1986 (PL 99-645); and North American Wetlands Conservation Act of 1989 (PL 101-233).
Cultural and Traditional Resources	National Historic Preservation Act (NHPA) (16 U.S.C. § 470 et seq.) (PL 89-865) as amended; Protection and Enhancement of the Cultural Environment-1971 (EO 11593); Indian Sacred Sites-1966 (EO 13007); American Indian Religious Freedom Act of 1978 (PL 94-341); Antiquities Act of 1906; American Indian Religious Freedom Act of 1979 (PL 96-95); Native American Graves Protection and Repatriation Act of 1990 (PL 101-601); Protection of Historic Properties (36 C.F.R. § 800); Preserve America (EO 13287); Consultation and Coordination with Indian Tribal Governments (EO 13175), and Archeological Resources Protection Act (PL 96-95; 16 U.S.C. § 470).
Hazardous and Toxic Substances and Waste	Resource Conservation and Recovery Act of 1976 (PL 94-5800), as Amended by PL 100-582; USEPA, subchapter I-Solid Wastes (40 C.F.R. § 240-280); Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. § 9601) (PL 96-510); Toxic Substances Control Act (PL 94-496); USEPA, Subchapter R-Toxic Substances Control Act (40 C.F.R. § 702-799); Federal Insecticide, Fungicide, and Rodenticide Control Act (40 C.F.R. § 162-180); Emergency Planning and Community Right-to-Know Act (40 C.F.R. § 300-399); Federal Compliance with Pollution Control Standards-1978 (EO 12088), Superfund Implementation (EO 12580); Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition (EO 13101); Greening the Government Through Efficient Energy Management (EO 13123); and Greening the Government Through Leadership in Environmental Management (EO 13148).
Socioeconomics	Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898); and Protection of Children from Environmental Health Risks and Safety Risks (EO 13045).

1.6 SCOPE AND ORGANZATION OF THE ENVIRONMENTAL ASSESSMENT

The geographic scope of this EA is the NPTU Charleston campus (refer to Figure 1-2) located along the Cooper River in Berkeley County, SC. However, the region of influence for some resource areas evaluated, such as socioeconomics, includes a larger geographic area. The resource categories determined relevant to this assessment include land use and coastal zone management; soils, water, and biological resources; transportation (vehicle and ship); socioeconomics; public health and safety; hazardous and toxic materials and waste; infrastructure and utilities; cultural resources; and nuclear and radiological aspects of the MTS power plants.

To summarize, Chapter 1 (this chapter) provides background information relevant to the Proposed Action and discusses its purpose and need. Chapter 2 presents the Proposed Action, alternatives to accomplish the Proposed Action, No Action Alternative, and alternatives eliminated from detailed consideration. Chapter 3 identifies, justifies, and defines the particular resources evaluated in this EA, describes baseline conditions (i.e., the conditions against which the potential impacts of the Proposed Action alternatives are measured) for each of the resource areas, and identifies the specific region of influence or affected environment (i.e., the area potentially impacted by the Proposed Action alternatives) for the resource. The potential environmental impacts/consequences of the action alternatives are also evaluated in Chapter 3. In Chapter 4, analysis of cumulative effects is presented. These effects include evaluation of the Proposed Action alternatives in relation to past, present, and/or any future foreseeable actions (other than just the Navy) within the affected environment. Chapter 5 outlines mitigation measures and other NEPA considerations, such as relationship between short-term use of the human environment and maintenance and enhancement of long-term productivity; irreversible and irretrievable commitments of resources; and greenhouse gas emissions, are presented in Chapter 6. Chapter 7 contains references cited in preparation of this EA and Chapter 8 provides a list of EA preparers.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

CHAPTER TWO: DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

NEPA implementing regulations (40 C.F.R. § 1502.14), as well as Navy (OPNAVINST 5090.1C) and Air Force (32 C.F.R. § 989) NEPA guidance require rigorous exploration and objective evaluation of all reasonable alternatives for a federal action. Each of the alternatives must be feasible, reasonable, and meet the stated purpose and need of the Proposed Action.

As discussed in Chapter 1, the Proposed Action is needed to ensure that NPTU Charleston continues to meet requirements of providing highly qualified nuclear operators and supervisors for the Naval Nuclear Fleet. If NPTU Charleston does not meet the Fleet's demand, then nuclear-powered warships, which comprise 45 percent of the Navy's major combatants, will not be sufficiently staffed with trained Naval nuclear propulsion plant operators and officers to perform missions vital to national security. This chapter provides a detailed description of the Proposed Action (Section 2.1), Alternatives Evaluated in Detail (including no action) in Section 2.2, and Alternatives Considered But Not Carried Forward (Section 2.3).

2.1 PROPOSED ACTION

NPTU Charleston proposes to alleviate current overcrowding, accommodate increased student throughput (with associated increase in NPTU staff), provide facilities for transitioning to newer MTSs, allow for uninterrupted student training during MTS transition, provide upgraded power supply, and ensure all facilities meet DoD, Navy, and Air Force security requirements. To accomplish this, the Proposed Action would: demolish, renovate, and upgrade existing facilities and infrastructure; construct academic and training facilities; relocate MTS support systems; increase the number of parking spaces; expand pier facilities to support uninterrupted MTS operation and training during the transition to the newer MTSs; and implement improved security and access measures. The following is a discussion of the criteria used to identify elements of the Proposed Action and reasonable alternatives.

Facility Size and Configuration. New facilities need to be large enough to support existing as well as anticipated student throughput on a long-term basis, specifically:

- Because NPTU Charleston is located completely within the explosive safety quantity distance arc of Wharf Alpha (a munitions storage area and pier located approximately one-half mile south of NPTU), all buildings are required to:
  - Conform to the design and construction requirements to protect personnel within inhabited structures as set forth in OPNAVINST 5530.14C and AFM 91-201.
  - Conduct advance site plan review and approval by DoD Explosives Safety Board and Air Force Safety Center through Naval Ordnance Safety and Security Activity.
- Training Support Buildings need to:
  - Support both increased student numbers and the associated additional staff;
  - Accommodate increased number and size of classrooms than currently configured;

- Include an auditorium (none available at this time) to provide instruction to larger audiences;
- Include a new cafeteria for increased student and staff numbers;
- Be built on shore to replace office and training space found in barge IX-516;
- Be correctly configured to accommodate two S6G Watchstation IDEs;
- Support on-shore MTS command, reactor support and maintenance areas, as well as storage capacity currently found off hull on barges IX-516, YC-1596, YFN-797, and YFNX-20; and
- Be co-located with the MTSs to ensure training continuity.

- Utilities need to be:
  - Provided to the MTSs and protected against deterioration.
  - Upgraded to provide additional electrical capacity and alternate power supply to NPTU Charleston on JB CHS-W.
- Piers need to be:
  - Extended and upgraded to allow transition to newer MTSs without interrupting on-going operation and training opportunities on the existing MTSs, and
  - Able to accommodate the temporary surge of student throughput when one of the reactor platforms at NPTU Ballston Spa is deactivated and the other platform refueled.
- Parking areas need to:
  - Support the long-term increase in student and staff loading, and
  - Replace the 490 spaces lost to security requirements and new facility construction.

Access and Security. These criteria were identified to meet DoD's UFC 4-010-01, Air Force's AFM 91-201, and Navy's OPNAVINST 5530.14C security mandates:

- Centrally locate the security gatehouse to provide a single access point to all NPTU restricted areas;
- Provide for the 30-ft interior standoff distance between NPTU facilities and the security fence and the 20-ft exterior distance between the fence and parking areas;
- Provide a continuous security barrier from PSB ends around on-shore facilities;
- Realign existing PSB to accommodate new MTS and pier security dimensions; and
- Move the vehicle entrance and inspection area (Sally Port) to provide for more direct access from Old Tom Road.

Through collaboration among NPTU, Naval Facilities Engineering Command (NAVFAC) Southeast, and JB CHS planning and environmental staffs, and by applying the criteria discussed above, the Navy identified the elements to support the Proposed Action: construct on-shore training and support facilities, expand the northern pier (Pier X-Ray North), upgrade utilities on JB CHS-W and NPTU Charleston, provide for more parking spaces, and improve access and security measures. In accordance with Navy and Air Force (Air Force 2007) policies, all new construction would conform with the Energy Policy Act of 2005 (as codified under 10 C.F.R. § 433 and 435) as well as achieve at least Silver-Level ratings under the Leadership in Energy and Environmental Design (LEED) certification process, to the maximum extent practicable given explosive safety standard requirements. LEED is a rating system for sustainable building design, construction, and maintenance developed and maintained by the U.S. Green Building Council (USGBC 2011).

2.2 ALTERNATIVES EVALUATED IN DETAIL

Using the criteria identified above, the Navy identified five action alternatives that best accommodated the elements presented above for the Proposed Action. Under any of these action alternatives, the area proposed for development lies within JB CHS-W and in the immediate vicinity of the NPTU campus. Figure 2-1 illustrates the general area proposed for development, inside of which all construction would occur. Table 2-1 provides an overview of the construction and development elements of the five action alternatives.

2.2.1 Alternative 1 (Preferred Alternative)

Alternative 1 best meets the NPTU mission and the purpose and need (Section 1.3) as stated in this EA. It includes all of the elements (Figure 2-2) presented under the Proposed Action (Section 2.1 above) and would construct a 300-ft pier extension to Pier X-Ray North. This alternative would moor the first replacement MTS (MTS 701) with the bow facing downstream (or bow-to-bow with MTS 711 once it is established at the NPTU). This configuration would require both MTSs to be outfitted so that they can be moored both up and down stream, as well as maintain a safe separation distance of about 60 ft for survival mooring. The existing mooring system for each boat consists of seven mooring chains, three of which extend into the navigational channel no more than 100 ft. Each of the mooring chains are anchored by a stake pile driven into the river bottom, the mooring chain is weighted so that the majority of its length rests on the river bottom until about 25 ft from the MTS, where it is then buried below dredge depth. The expected survival mooring system will be the same as or similar to that currently in place. The expanded PSB would be anchored using a system that is similar to the existing PSB with mooring legs extending into the existing channel installed below the existing navigable depth.

Using the bow-to-bow configuration complicates long-term MTS 701 operation (i.e., the ship needs to be retrofitted to allow this configuration); however, it would minimize encroachment along the navigation channel. This configuration also requires a shorter pier than the traditional bow-to-stern configuration. In total, site development to support the alternative would total close to 18 acres.

Facilities

Demolition of Existing Buildings – The current shipping and receiving point, Bldg 43, would be demolished to support construction of Training Support Building 2A. Shipping and receiving functions would be moved to Training Support Building 2.

Table 2-1 Construction/Development Comparison of the Action Alternatives

Item	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Facilities					
Interior Renovations TSB 1	Yes	Yes	Yes	Yes	Yes
Training Support Building 2	90,000 sf	90,000 sf	90,000 sf	90,000 sf	90,000 sf
Academic and Training	75,000 sf	75,000 sf	75,000 sf	75,000 sf	75,000 sf
Off-Hull Support Operations	5,000 sf	5,000 sf	5,000 sf	5,000 sf	5,000 sf
Storage	10,000 sf	10,000 sf	10,000 sf	10,000 sf	10,000 sf
Remove/Replace YC-1596, YFN-797, YFNX-20	Yes	Yes	Yes	Yes	No
Demolish Building 43	9,600 sf	9,600 sf	9,600 sf	9,600 sf	No
Training Support Building 2A	90,000 sf	90,000 sf	90,000 sf	90,000 sf	No
Remove/Replace	IX-516	IX-516	IX-516	IX-516	No, IX-516 Moved
Utilities					
Upgrade Electric Supply to NPTU Charleston	Yes	Yes	Yes	Yes	Yes
Pier Renovations/Construction					
X-Ray North Finger Pier Demolished	Yes	Yes	Yes	Yes	Yes
X-Ray North Extension	18,100 sf	18,100 sf	24,400 sf	24,400 sf	18,100 sf
X-Ray South Extension	No	No	No	No	No
Replace X-Ray North Pier Utilities	Yes	Yes	Yes	Yes	Yes
Upgrade X-Ray South Pier Utilities	Yes	Yes	Yes	Yes	Yes
Security and Access					
Gate House	7,500 sf	7,500 sf	7,500 sf	7,500 sf	7,500 sf
Sally Port	Yes	Yes	Yes	Yes	Yes
Guard Tower	Yes	Yes	Yes	Yes	Yes
Meet ATFP Standoff Distance	Yes	Yes	Yes	Yes	Yes
PSB and Security Fence Upgrades	Yes	Yes	Yes	Yes	Yes
Old Tom Road Upgrades	Yes	Yes	Yes	Yes	Yes
Parking					
Parking Structure		500		500	
Parking Spaces (Without Parking Structure)	1,900	1,400	1,900	1,400	1,900

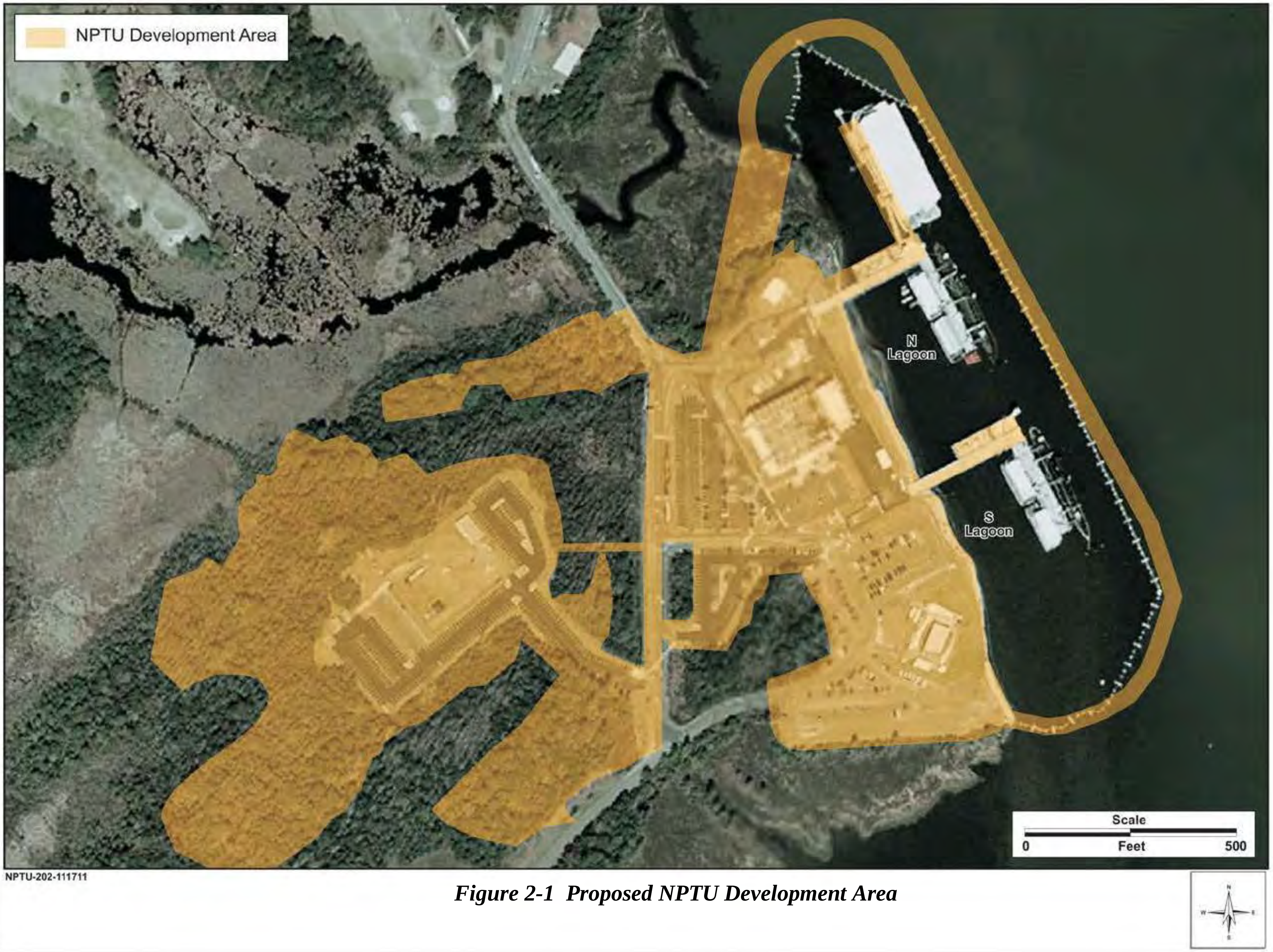

Figure 2-1 Proposed NPTU Development Area

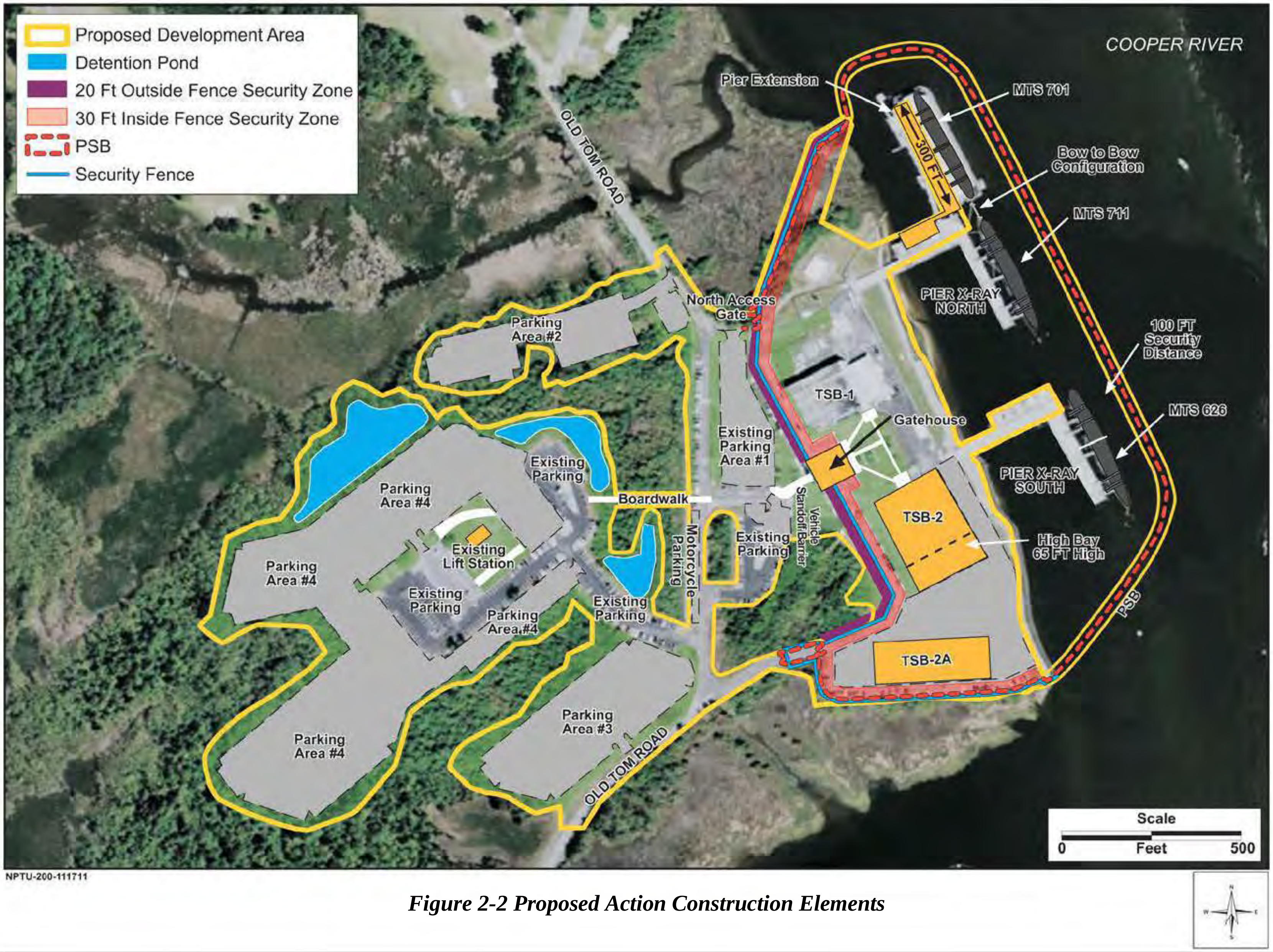

Figure 2-2 Proposed Action Construction Elements

Training Support Building 2 (TSB 2) – The new TSB 2 would total approximately 90,000 square feet (sf), spread over three stories, with 16-inch (in) reinforced concrete walls. No exterior windows would be constructed to conform to requirements associated with the explosive safety arc for Wharf Alpha. The building would be configured to accommodate the high bays needed to house the two S6G Watchstation IDEs and include a 5,000-sf area for off-hull MTS support functions of YC-1596 and YC-797, and 10,000 sf for storage space to serve as a shipping/receiving point when Bldg 43 is demolished. Demolition, site preparation, and construction would begin in FY14.

Training Support Building 2A (TSB 2A) – This building would also be approximately 90,000 sf within a three-story structure. TSB 2A would replace all functions currently handled by the IX-516 barge to include training space, professional offices, spare parts storage, and maintenance facilities to support operation of the reactor plants. As with TSB 2, TSB 2A would be a hardened concrete structure, with no exterior windows. Demolition, site preparation, and construction for this facility would begin in FY15.

To accommodate the peak increase in students and staff (when it coincides with building construction, pier extension activities, and presence of three MTSs), temporary office spaces would set up in trailers, and minor parking expansion would be undertaken.

Pier Revisions

The existing finger pier at Pier X-Ray North, now used by the IX-516 support barge, is not capable of berthing any type of MTS. The finger pier, therefore, would need to be demolished and Pier X-Ray North extended to accommodate the mooring of the newer MTSs. The approximate 300-ft addition to the length of Pier X-Ray North would allow two S6G MTSs to be moored while maintaining safe separation for MTS survival moorings. Pier X-Ray South may be modified to include additional pilings to provide mooring to support the temporary relocation of the IX-516 to the shore side of Pier X-Ray South in FY15. Expansion activities would start in FY14. During pier construction vessel stabilization pilings may be installed to facilitate movement of construction personnel, equipment, and materials to the pier construction area.

The first replacement MTS (MTS 701), initiating the transition, would arrive in FY17 and be moored. Necessary connections to shore facilities would be completed, staff training and qualification undertaken, and student training continued without interruption to training activities on existing MTS 635. In FY18, once training classes are completed, MTS 635 would be removed and towed to a naval shipyard for defueling prior to being dispositioned using the well-established Navy processes for disposal of nuclear submarines. An existing pier would be refurbished to support the arrival of the second replacement MTS (MTS 711) in FY19.

For a few months in 2017 and from 2019 to 2021, three MTSs would be moored to the two piers so that staff training and qualification is accomplished and student training continued without interrupting training throughout the transition period. Following resumption of training at NPTU Ballston Spa in FY21, MTS 626 would be removed and towed to a naval shipyard for defueling prior to being dispositioned. The open berth would be used for mooring during periodic maintenance and permitted dredging activities.

Utility Needs

A concrete utility trench would be constructed at Pier X-Ray North (similar to existing conditions at Pier X-Ray South) to house all support utility connections from the MTS to on-shore facilities; work on this aspect of the pier expansion would begin in FY14. Currently, the utility lines for Pier X-Ray North run directly under (suspended from) the pier and are exposed to salt water, wind, and adverse weather conditions. Utilities include electricity, potable water, and communication. Other utilities would include those for discharge of bilge water and sewage. In addition, electrical power capacity would be increased to NPTU Charleston using existing JB CHS-W power lines. Additional electrical power lines would be added on JB CHS-W along existing utility corridors to provide an alternate source of power to NPTU Charleston to minimize the potential for power loss at the site.

Access and Security Requirements

Site Security Upgrades – As stated in Chapter 1, NPTU Charleston security systems do not currently meet applicable ATFP, OPNAVINST, or AFM standards. Implementing the Proposed Action would ensure compliance with mandatory security requirements. The on-shore security fence would be extended to meet security requirements. Vehicle access and inspection entrance (Sally Port) would be relocated to the south due to TSB construction and to provide more direct entry from Old Tom Road; an additional guard tower would be added to the Pier X-Ray North extension. The PSB would also be expanded to provide the required 100-ft separation to the newer MTSs moored at the Pier X-Ray North. The relocated PSB would expand no more than 270 ft further upstream, parallel to the shoreline (see Figure 3.7-2).

Security Gatehouse – The new gatehouse would be approximately 7,500 sf on one floor, with 8-in thick concrete reinforced walls. It would be located separate from any of the TSB facilities and be sited centrally for a single point of access. The new gatehouse would provide safe separation of visitor verification from daily NPTU activities and training.

Demolition, site preparation, and construction for security requirements would begin in FY14.

Parking

The existing parking spaces are inadequate to meet current student throughput. Additional areas would need to be cleared and paved sufficient to support both existing and increased student and staff loading as well as to replace the 490 parking spaces lost to new facility construction and ATFP security standoff requirements. Total surface parking, therefore, needs to accommodate up to 1,900 spaces. Of this total, about 550 existing spaces would be resurfaced and up to 1,350 new spaces constructed. Two new entrances would be added to access parking areas from Old Tom Road and pedestrian walkways around the parking areas and Old Tom Road constructed to ensure safe and efficient personnel movement to and from the NPTU security gate to parking areas. Expansion of the parking areas would be started in FY13.

Sidewalks (and possibly a boardwalk over wetland areas) would be constructed from the parking areas to the security access point.

Other Associated Elements

Other improvement-related activities associated with implementing the Proposed Action include removal, relocation, and/or demolition of facilities, dredging, and fill material.

Removal, Relocation, and/or Demolition. Currently, many off-hull functions are maintained by support barges YC-1596 and YFN-797, including receipt and processing of bilge and steam-generator waste water, as well as systems to produce and deliver purified water for use on the MTSs. These barges also support maintenance and parts storage functions. Command barge YFNX-20 provides classroom and administrative space. The IX-516 barge provides training and support functions, office and storage space, and is moored to the Pier X-Ray North. Locating MTS support services on these barges causes down time in MTS operations during barge maintenance periods and interrupts training due to the need to tow the barges to survival moorings whenever hurricanes are forecasted to be approaching the Charleston area. The use of these barges is inefficient due to the need to tow them to dry-dock for routine maintenance. Alternative 1 solves these training down time and maintenance issues by replacing their functions and moving them to on-shore facilities. The functions of the two off-hull support barges would be housed in TSB 2. Once TSB 2 has been completed (anticipated in FY16), Bldg 43 would be demolished and its function incorporated into the TSB. The functions of IX-516 and YFNX-20 barges would be housed in TSB 2A; completion of this facility is anticipated to be in FY17. During the construction phase of the Proposed Action, NPTU Charleston expects to relocate and moor the IX-516 barge to the south lagoon of Pier X-Ray South to ensure adequate space is maintained before the completion of TSB-2A (refer to Figure 2-1). During the IX-516 relocation, temporary pilings would be put in place in the south lagoon. The IX-516 barge and temporary pilings would then be removed after completion of TSB-2A.

Dredging and Fill Needs. Proposed pier extension/renovation would coincide with the regular maintenance dredging activities approved by the U.S. Army Corps of Engineers under Permit Number 2009-00175-21R. Approximately 60,000 sf of dredging is required to reach a depth not to exceed 42 ft, for a total dredge volume of about 27,000 cubic yards (cy). This would occur within the permitted dredging footprint along the face of the X-Ray Piers. However, to support IX-516 during the transition period, there would be a one-time dredging requirement in the south lagoon already included in the existing dredging permit. Materials dredged from this site would be disposed of at the nearest available Navy spoils area (there is one adjacent to JB CHS-W and has the capacity to support this dredge material). About 68,000 cy of clean fill dirt from off-base, local sources would be needed to support on-shore facility and infrastructure construction. The fill dirt would be tested to ensure that it is clean before use.

2.2.2 Alternative 2

Alternative 2 entails the same elements as Alternative 1 (i.e., construction schedule, bow-to-bow MTS configuration, approximate 300-foot pier extension and renovations, facility requirements, security needs, and access), refer to Figure 2-3, at the top. It would meet all NPTU mission requirements, but would include constructing a multi-level parking structure to accommodate up to 500 vehicles and less surface parking (by not constructing Parking Area 3) to support about 1,400 spaces. Close to 16 acres would be disturbed to support construction and development of Alternative 2. Overwater shading and dredging of 27,000 cy would be similar to Alternative 1. Stormwater runoff would be minimized with construction of the parking facility.

2.2.3 Alternative 3

Alternative 3 is the same as Alternative 1 except for MTS mooring configuration (refer to Figure 2-3, at the bottom). About 18 acres would be disturbed to support development. The MTSs would be configured facing up stream and be moored bow-to-stern at Pier X-Ray North. This alternative would require 110 ft between the two MTSs to maintain minimum separation for the survival moorings. To support this configuration, Pier X-Ray North would need to be lengthened to 480 ft (versus the 300-ft length found under Alternatives 1 and 2), for a total of 24,400 sf. In addition, the PSBs would require placement further along the navigation channel (about 330 ft versus 270 ft parallel to the shoreline) to support the 100-ft security distance to the MTSs. When compared to Alternatives 1 and 2, there would be further encroachment of the security barriers along the navigation channel, dredging materials and amount disposed would increase, and overwater shading would be greater. Stormwater runoff would be similar to Alternative 1.

2.2.4 Alternative 4

Alternative 4 meets NPTU mission requirements and involves the same elements as Alternative 3. However, a multi-level parking structure would be built to accommodate 500 spaces (thus eliminating the need for Parking Area 3) and land cleared and paved to support about 1,400 more spaces (refer to Figure 2-4, at the top). Close to 16 acres would be disturbed to support construction and development of Alternative 4. The MTS configuration would be bow-to-stern, the pier extended a total of 480 ft, and the PSB placed to ensure the 100-ft security distance. When compared to Alternatives 1 and 2, there would be more impacts due to increased overwater shading and the amount of area dredged. The extended pier and associated PSB could potentially cause further encroachment along the navigation channel. Stormwater runoff would be minimized with construction of the parking facility.

2.2.5 Alternative 5

Under this alternative, TSB 2A would not be built, therefore, functions currently supported in IX-516 barge would remain in place but would be upgraded to better support increases in student numbers. Parking spaces removed would total close to 200, therefore, about 820 more spaces would be needed to support the 1,900 spaces. In total, about 17 acres would be disturbed to support (refer to Figure 2-4,

Alternative 2

Alternative 3

Figure 2-3 Alternatives 2 and 3 Proposed Development

Alternative 4

Alternative 5

Figure 2-4 Alternatives 4 and 5 Proposed Development

Alternative 5 at the bottom). To implement this alternative, IX-516 would be maintained at Pier X-Ray South. Additional storage and warehouse space would need to be identified at existing on-Station facilities; no new construction for warehousing would be involved. Dredging activities and stormwater runoff would be similar to all the other alternatives (i.e., stay within permitted dredge boundaries and at a frequency consistent with current conditions).

2.2.6 No Action Alternative (Alternative 6)

Navy and Air Force regulations that implement NEPA require that, for a clear basis for choice among options by the decision maker and the public, a no action alternative must be included and analyzed. Under the No Action Alternative, the current NPTU facilities would remain unchanged. However, the long-term, 50-percent increase in student throughput at NPTU Charleston will still occur and the two replacement S6G MTSs will arrive as scheduled. Under this alternative, no additional TSB facilities, utility upgrades, security improvements, parking space additions, or extended/constructed piers would occur. By adopting this alternative, NPTU Charleston would be considerably strained to meet the mandated increased student throughput or MTS transition. This could cause shortfalls in the number of trained Naval nuclear operators for deployment to the Naval Fleet. While this alternative is unacceptable for the Navy, it represents current conditions and is used as a basis from which to compare impacts. This alternative, while not meeting the purpose and need, is carried forward for analysis in this EA for impact comparison purposes.

2.3 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

Establish NPTU Charleston at Another Location – The Navy evaluated whether another location would be suitable to support the NPTU student and staff increases and MTS transition. After consideration, it was determined that the infrastructure needs such as: 1) having a site that conforms to the unique regulatory requirements for operating nuclear-powered propulsion plants and 2) needing a location that facilitates the fast-paced training program that integrates classroom instruction in the TSB with immediate hands-on training at the MTS, thereby calling for contiguous location of the TSB with the MTS, were integral to alternative consideration. The only available site is at NPTU Charleston. NPTU Ballston Spa was not considered as an alternative location because it does not support in-water MTSs.

Renovate/Modernize Other Facilities – No facilities on JB CHS-W exist that are contiguous with the MTSs or could be modified to provide satisfactory support of NPTU student and staff increases and MTS transition. Therefore, renovating and/or modernizing other facilities was not an option.

Facility Leasing – Leasing an offsite facility was not a feasible alternative because most of the required training material is classified and must remain within the confined NPTU security perimeter. In addition, classroom facilities must be located in proximity to the MTSs, allowing students to move readily between the classroom and MTSs while still remaining within a secured area.

Alternative Pier Configurations – To determine the best configuration with the least impact, the Navy considered six different pier configurations with the intent of identifying all viable options for NPTU

Charleston. These configurations included new, separate piers located north of Pier X-Ray North and south of Pier X-Ray South; and extending Piers X-Ray North and South. Alternatives extending Piers X-Ray North or South were carried forward. The other alternatives were not considered reasonable due to unacceptable separation of the MTS from the TSBs, interference with on-going MTS operations, siltation, and ship stability concerns.

Transportation Alternatives – The Navy evaluated the potential for students and staff to car pool, use public transportation, and take advantage of base transportation services. However, student training is conducted so that classes are small and staggered over a 24-hour period, 7 days a week. Students and staff are coming and going throughout the day and night so need the flexibility that only commuting in their own vehicles allows.

2.4 ENVIRONMENTAL PROTECTION

The Navy and NPTU Charleston would follow all applicable federal, state, and local laws and regulations designed to protect the human and natural environment. Prior to any land disturbance or construction, NPTU Charleston will conclude consultation with the appropriate agencies, coordinate with American Indian Tribes, and acquire all applicable permits as discussed in Section 1.5 and Chapter 3. During construction and demolition activities, numerous measures would be taken to avoid, protect, and minimize impacts. These include, but are not limited to:

- Confining construction activities to those developed area limits identified in the EA;
- Conducting earthwork to minimize duration of exposure of unprotected soils;
- Constructing/installing temporary and permanent erosion and sedimentation control features;
- Removing and properly disposing of debris, rubbish, and other waste resulting from construction;
- Identifying resources to be preserved within development areas;
- Limiting dust and dirt rising and scattering in the air by use of mulch, water sprinkling, temporary enclosures, and other methods; and
- Managing construction activities to minimize interference with and damage to fish and wildlife, including threatened and endangered species.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

CHAPTER THREE: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ANALYSIS APPROACH

NEPA requires focused analysis of the areas and resources potentially affected by an action or alternative. An EA should consider, but is not required to analyze in detail, those areas or resources not potentially affected by the proposal. Both description and analysis in an EA should provide sufficient detail and depth to ensure that the agency (i.e., the Navy and Air Force) took a hard look at the proposal and the potential impacts it might have on the human and natural environment. NEPA also requires a comparative analysis that allows decision makers and the public to differentiate among the alternatives.

This chapter describes the existing conditions for resources potentially affected by the Proposed Action and alternatives described in Chapter 2. Analysis of the affected environment (refer to Figure 2-1 for the area affected by this proposal) provides a framework for understanding the direct, indirect, and cumulative effects of the Proposed Action and alternatives. This chapter also analyzes the impacts of the Proposed Action and alternatives on these resources.

3.1.1 Resources Analyzed

Table 3.1-1 presents the potential resources that could be analyzed in this EA. A total of 14 resource categories were evaluated for their potential to be impacted by non-radiological aspects of the Proposed Action: 1) land use and coastal zone management, 2) geological resources (geology, topography, seismology, and soils); 3) water resources (including wetlands, floodplains, surface and storm waters, and water quality); 4) biological resources (including terrestrial and aquatic vegetation, wildlife, and sensitive species); 5) transportation (including ground traffic and navigation); 6) socioeconomics (including economics, environmental justice, provisions for the handicapped, and protection of children); 7) public health and safety; 8) hazardous and toxic materials and waste; 9) infrastructure and utilities (power, communications, sewage, and solid waste); 10) cultural and traditional resources; 11) air quality; 12) visual and recreational resources; 13) noise; and 14) global climate change. Consideration was then given to each resource and it was noted whether the resource would be potentially impacted by implementing the Proposed Action or alternatives. If a resource was determined to have negligible or no impacts it was not considered further for analysis; justification for not carrying it forward is discussed following the table.

Radiological aspects of impacts to resources are discussed at length in Section 3.11.

Table 3.1-1 Resources Analyzed to Determine Non-Radiological Impacts and Need for Further Evaluation

Categories/Resources	**Elements of Proposed Action and Anticipated Impact**			
	Demolition/ Construction	***Dredging***	***Personnel Increase***	***Operations***
Land Use and Coastal Zone Management	Minor	Minor	Minor	Minor
Geological Resources	None	None	None	None
Water Resources				
Wetlands	Yes (Mitigated)	None	None	None
Floodplains	Yes (No Practicable Alternative)	None	None	None
Surface and Storm Water	Temporary/Minor	Temporary/Minor	None	None
Water Quality	Minor	Minor	None	Minor
Biological Resources				
Terrestrial Biology (vegetation, wildlife, threatened and endangered species)	Minor	None	None	None
Aquatic Biology (vegetation, wildlife, threatened and endangered species)	Minor	Minor	None	None
Transportation				
Ground Traffic	Temporary/Minor	None	Minor	None
Navigation	Temporary/Minor	Temporary/Minor	None	None
Socioeconomics				
Economics (demographic, economic, housing)	Minor	None	Minor	None
Environmental Justice	None	None	None	None
Provision for the Handicapped	None	None	None	None
Protection of Children	None	None	None	None
Public Health and Safety	Temporary/Minor	None	None	None
Hazardous and Toxic Materials and Waste	Temporary/Minor	None	None	Minor
Infrastructure and Utilities	Minor	None	Minor	Minor
Cultural and Traditional Resources	None	None	None	None
Air Quality	Temporary/Minor	None	Minor	Minor
Visual and Recreational Resources	Temporary/Minor	None	None	Minor
Noise	Temporary/Minor	None	None	None
Global Climate Change	Minor	Minor	Minor	Minor

3.1.2 Resources Eliminated from Further Analysis

NEPA and CEQ regulations, as well as Navy and Air Force procedures for implementing NEPA, specify that an EA should focus only on those resource areas potentially subject to impacts. In addition, the level of analysis applied to any given resource area should be commensurate with the level of impact anticipated for that resource. Applying these guidelines, the following resource areas are not analyzed in detail in this EA: environmental justice, provisions for the handicapped, cultural and traditional resources, non-radiological air quality, visual and recreational resources, noise, and global climate change. A discussion as to why these seven were eliminated from detailed analysis is provided below.

Environmental Justice/Protection of Children. Implementation of the Proposed Action would comply fully with EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income*

Populations, and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. The proposed action would occur entirely within the boundaries of JB CHS-W at the NPTU Charleston campus. There is no minority or low-income populations adjacent to or near NPTU Charleston; therefore, they would not be disproportionately impacted if this proposal were implemented. Being an active military training site, there are neither schools nor children in the vicinity of NPTU Charleston, so they would not be affected. The nearest schools are Marrington Middle and Elementary Schools, both located approximately 3 miles to the northwest from NPTU Charleston. The nearest residence is located approximately 1 mile north of NPTU Charleston. In summary, no environmental justice or protection of children issues would occur under the Proposed Action and these resource areas are not carried forward for detailed analysis. For radiological aspects, there would be no disproportionate impacts to environmental justice populations, see Section 3.11.7.2.2 for further information.

Provisions for the Handicapped. According to Deputy Secretary of Defense Memorandum dated October 2008, it is the goal of DoD to make its facilities accessible to persons with disabilities (DoD 2008). To achieve that goal DoD requires that the more stringent of either the *Uniform Federal Accessibility Standards* (49 Federal Register 31528 [August 7, 1984]) or the 1991 version of the *Americans with Disabilities Act (ADA) Accessibility Guidelines* be applied all DoD facilities designed, constructed (including additions), altered, leased, or funded by DoD. Specifically, DoD has adopted the standards from the Architectural Barriers Act of 1968 (ABA), as amended (42 U.S.C. § 4151, *et seq*.); Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794); and the 2004 *ADA and ABA Accessibility Guidelines* (ADA-ABA 2004). Under the Proposed Action, these standards apply to parking spaces, access routes and entrances, administrative, and academic facilities; the only exception is for facilities or portions of facilities that are designed and constructed for use (e.g., MTSs and IDEs) exclusively for able-bodied military personnel (DoD 2008). The Navy would follow all applicable orders, laws, and regulations in facility design and construction to ensure provision for the handicapped; therefore, no impacts are anticipated to this resource category.

Cultural Resources. Cultural resources are defined as archaeological, architectural, or traditional. Archaeological Resources include prehistoric archaeological sites through recent 20th century historical components. All unevaluated resources are treated as eligible for the National Register until determined otherwise. Architectural Resources include historic properties and structures, which are included in, or eligible to be included in the National Register of Historic Places. Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended requires federal agencies to consider the effects of their actions on historic properties before undertaking a project. The building being demolished is not considered eligible under this act. Traditional Resources are associated with specific American Indian traditional resources or sacred sites or areas on JB CHS-W.

In 1994, NPTU Charleston was surveyed in its entirety and no eligible resources were found in the area of potential effect immediately surrounding and within the NPTU campus (USACE 1994). In response to agency coordination for this proposal and prior cultural resource surveys, the State Historic Preservation Officer concurs with the Navy that there would be no effect to listed or eligible properties (see Appendix

A). If during construction activities, however, an inadvertent discovery of cultural resources were made, construction activity would cease; the JB CHS cultural resources manager would be notified; and prescribed procedures for protection, as set forth in the Integrated Cultural Resources Management Plan (NAVFAC 2003a), would be followed. Letters were sent to federally-recognized American Indian Tribal representatives, notifying them of the proposal; two responded with no objections (see Appendix A).

Air Quality. The Clean Air Act (CAA) requires the USEPA to establish National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. There are primary and secondary standards under the NAAQS. Primary standards set limits to protect public health, including “sensitive” populations. Secondary standards set limits to protect public welfare, including protection from decreased visibility, damage to animals, crops, vegetation, and buildings. Areas that are in violation of the NAAQS are designated non-attainment or in management for attainment of criteria pollutants. NPTU Charleston is neither located within an area of non-attainment nor in management for attainment of any of the criteria pollutants; therefore, no thresholds of significance can be applied.

Pollutant emissions are generated in the short term by construction activities and in the long term by NPTU Charleston training operations and increased numbers of personnel commuting. Construction equipment engine combustion and soil moving activities would cause release of criteria pollutants; however, these releases would be temporary and minor in nature and would not change attainment status nor degrade regional air quality. For purposes of this EA, all construction was assumed to take place in 1 year and that all increases in students and staff would occur in that same year. These assumptions would represent the greatest amount of emissions that could take place regardless of the alternative chosen. In summary, emissions of nitrogen oxides would be no more than 20 tons, carbon monoxide would be no more than 22 tons, volatile organic compounds would be less than 4 tons, and all other criteria pollutants (sulfur oxides and particulate matter) would be no more than 1 ton (refer to Appendix B for specific emissions calculations). These emissions would not introduce significant impacts; however, best management practices (BMPs) such as wetting soils and revegetating as quickly as possible to lessen fugitive dust generation and reducing construction engine idling time to decrease combustion-generated emissions, would be used during construction to minimize pollutant emissions.

Once fully operational, diesel-fueled emergency generators would occasionally emit pollutants; however, emissions associated with these generators would be negligible. In fact, these newer generators would replace current, less efficient models, would only be used on a temporary, emergency basis, or run periodically to ensure readiness for emergency operation, in accordance with the provisions under the Synthetic Minor Permit already in place at JB CHS-W. This Permit would be updated in accordance with the South Carolina Department of Health and Environmental Control requirements. Growth in the number of personnel driving vehicles for commuting purposes would also increase; however, not to such an extent to introduce emissions that would change the area’s status of attainment or degrade regional air quality. Other than MTS-related air emissions discussed in Section 3.12, air quality is not analyzed further in this EA.

Visual and Recreational Resources. Visual resources would be minimally impacted. NPTU Charleston resides within an active military installation and the facilities proposed for construction are consistent with the military mission and other facilities found on base. While construction would occur along the Cooper River waterfront, the in-water piers and on-land facilities would be constructed within areas already identified for military use and would be consistent with conditions now found at or adjacent to the site. Electrical power lines would be installed on JB CHS-W in areas and along utility corridors already supporting utility lines and would not substantially change the visual landscapes at JB CHS-W. Therefore, no major deterioration to the viewshed would occur and would remain similar to existing conditions. This resource is not analyzed further in this EA.

Construction at NPTU Charleston would not affect any outdoor recreational areas. In terms of personnel increases and demand on recreational facilities, JB CHS-W has many on-base recreational facilities including several fitness centers, a golf course, baseball and soccer fields, tennis and basketball courts, swimming pools, bowling, as well as a library and movie theater. Off-base camping, boating, fishing, and swimming are also provided at Lake Moultrie and the Cooper River. It is anticipated that the increase in personnel can be accommodated at existing JB CHS-W recreational facilities, therefore, no impacts to recreational resources are anticipated and are not carried forward for further analysis.

Noise. Noise is typically defined as unwanted sound that causes annoyance or disturbance to the noise receptors in the general area around an activity. Proposed construction would occur within JB CHS-W at NPTU Charleston, along the west bank of the Cooper River. Noise generated from these activities would be short-term, and occur during typical day-light, working hours (potential noise effects to marine wildlife are presented in Section 3.4.2.2). Sensitive receptors, such as schools, hospitals, and residential areas, are not found either adjacent to or in the general vicinity of NPTU Charleston. The nearest schools are located approximately 3 miles to the northwest and the nearest residential area is located approximately 1 mile to the north. Therefore, noise generated from these activities would have no effect on these receptors. While the newer MTSs would represent new facilities, noise generated from their operation and maintenance would be similar to what is generated now by the two older MTSs. Other new facilities and increased student throughput would not introduce any novel noise impacts to JB CHS-W. As such, impacts to the human noise environment would be minor and not cause any impacts; therefore it is not analyzed further in this EA.

Global Climate Change. 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. To minimize GHG impacts, federal agencies and installations are required to comply with federal climate change policy including: EO 13423 (signed January 2007), *Strengthening Federal Environmental, Energy, and Transportation Management*; the *Federal Energy Policy Act* requiring federal agencies to increase the use of renewable sources by 3 percent between 2007 and 2009, 5 percent between 2010 and 2012, and by 7.5 percent for 2013 and beyond; and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (signed October 2009), which provides for early strategic guidance to federal agencies in the management of GHG emissions. On February 18, 2010, the CEQ released *NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions.* This Guidance suggests that proposed federal actions that would reasonably be anticipated to emit 25,000 metric tons or more of CO_2e GHG emissions should be evaluated by quantitative and qualitative assessments. While not a specific threshold of significance, this Guidance suggests that this be considered a minimum level for consideration in NEPA documentation.

Under any of the alternatives, GHGs would be emitted by construction and demolition activities as well as by operating the diesel-powered generators during power outages. However, none of these construction or operational activities would generate close to the 25,000 metric tons of carbon dioxide (CO_2) equivalent suggested as a threshold by CEQ. In fact, GHG emissions would be 0.00005 percent of 2011 U.S. emissions (see Appendix B for specific calculations). Because these impacts are not considered significant, GHGs are not analyzed further in this EA.

3.1.3 Affected Environment

The overall affected environment, i.e., NPTU Charleston campus, is the same for each alternative due to the limited geographic scope and locally isolated environmental interactions that are anticipated. The region of influence (ROI), however, may differ depending on the resource being analyzed. For instance, the ROI for land use comprises NPTU Charleston campus, while the ROI for socioeconomics and transportation impacts includes the tri-county area of Berkeley, Dorchester, and Charleston. The ROI for radiological impacts extends for a 50-mile radius from NPTU Charleston.

3.2 LAND USE AND COASTAL ZONE MANAGEMENT

Land use generally refers to human modification of land, often for residential, commercial, industrial, agricultural, recreational, and economic purposes. It also refers to the use of land for preservation or protection of natural resources (e.g. wildlife habitat, vegetation, or unique features). Unique natural features are often designated as national or state parks, forests, wilderness areas, or wildlife refuges. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of activities that are allowed or that protect specially designated or environmentally sensitive uses.

Coastal zone management refers to compliance with the Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. § 1451, *et seq*., as amended). In accordance with Section 307 of the CZMA and 15 C.F.R. § 930.30, all Federal agency activities, including development projects, affecting any coastal use or resource will be undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of approved management programs. CZMA policy is implemented through the State's coastal zone management program and activities taking place on Federal property within the coastal zone are subject to CZMA Federal consistency requirements. A Federal Coastal Consistency Determination is a conclusion supported by findings that a proposed activity affecting the use or resources of the coastal zone complies with the State's coastal zone enforceable policies, unless "…full consistency is prohibited by existing law applicable to the Federal government." In this case, the SCDHEC manages CZMA compliance through the Office of Ocean and Coastal Resource Management (OCRM).

3.2.1 Affected Environment

3.2.1.1 Land Use

Land use within NPTU Charleston is classified as either training or undeveloped by JB CHS-W. Lands classified as training include classroom and simulator facilities, as well as parking areas. Land classified as undeveloped includes all native or undisturbed land and graded land with no built foundation or structure (NWS Charleston 2002).

3.2.1.2 Coastal Zone Management

South Carolina protects its coastal environment through its CZMA of 1977, as implemented by the South Carolina Coastal Management Program. This program is administered by the SCDHEC through the OCRM. Critical areas that are directly managed by the OCRM are found from the high water mark to the landward point where tidal vegetation changes from predominately brackish to predominately fresh. The regulation of wetlands under the South Carolina Coastal Management Program is limited to areas below the watermark of ordinary high tide, except: 1) where upland activities are filling into coastal wetlands, and 2) where structures are being erected on sites suitable for water-dependent industry. Berkeley County, in which NPTU Charleston is located, is a coastal county, and therefore considered to be within the coastal zone. As such, a Federal Consistency Determination is required before implementing any of the Proposed Action alternatives.

3.2.2 Environmental Consequences

Impacts to land use would be adverse if the action alternatives (i.e., Alternatives 1 through 5) were: incompatible with surrounding land uses; would result in a change of land use that would degrade the mission-essential training; or would be inconsistent or in conflict with the environmental goals, objectives, or guidelines of a community or county comprehensive plan. The Coastal Zone Management impacts would be adverse if the action alternatives were not consistent to the maximum extent practicable with the principles and regulations outlined by South Carolina's Coastal Management Program.

3.2.2.1 Land Use

Action Alternatives

Implementation of any of the action alternatives would have minor impacts to lands use classification in the vicinity of NPTU Charleston. The proposed area for development is designated by JB CHS Planning as training or as undeveloped. Under any of the action alternatives, all facilities would be constructed within areas already classified as training; however, creating more parking areas would change about 8 acres of land currently classified as undeveloped to training. While these acres would be reclassified from undeveloped to training areas, the land use would be consistent with existing land use conditions, would not degrade mission-essential training (it would actually improve essential training), nor would any of the alternatives be in conflict with JB CHS planning goals. Therefore, no adverse impacts to land use would occur within NPTU Charleston.

No Action Alternative

Under the No Action Alternative, new facilities and pier extensions would not be built. There would be no parking areas constructed and no change to current land use designations. While land use would remain consistent, mission-essential training could be degraded due to inadequate academic and administrative facilities and not enough parking areas to support increased student and staff loading. If this alternative were chosen for implementation, NPTU Charleston could be constrained in its ability to provide nuclear-power reactor training.

3.2.2.2 Coastal Zone Management

Action Alternatives

Development within the coastal zone could not be avoided and while the alternatives would require construction and demolition within the coastal zone, all would have negligible, short-term impacts to coastal zone uses and resources. The expansion of piers and PSB under all alternatives would require permitting and coordination with USACE and SCDHEC. South Carolina currently has no submerged lands leasing policy; the permitting process and Federal Coastal Consistency Determination would ensure that no adverse impacts to navigable waters of the U.S. or SC's coastal zone would occur. Specifically, the following would be undertaken to ensure this conclusion:

- Minimize contamination and erosion from stormwater runoff by the use of prescribed BMPs during all phases of construction and demolition (e.g., silt fencing for erosion and sediment control, minimizing on-site construction waste, and revegetating as soon as possible), as well as after construction (e.g., detention ponds, draining to vegetated areas where applicable, and landscaping to absorb runoff).
- Meet DoD low impact development (LID) requirements for all projects that construct facilities with a "footprint" greater than 5,000 gross sf, or expand the footprint of existing facilities by more than 5,000 gross sf. The footprint includes all horizontal hard surfaces and disturbed areas associated with the project development, including both building area and pavements (such as roads, parking, and sidewalks). These requirements do not apply to internal renovations, maintenance, or resurfacing of existing pavements. Where projects are less than 5,000 sf, LID techniques apply to the extent practical (DoD 2010a). LID options could include, but are not limited to: minimize total site impervious areas, direct building drainage to vegetative buffers, use permeable pavements where practical, and break up flow directions from large paved surfaces (DoD 2010a).
- Avoid wetlands to the maximum extent practicable. While no more than 7 acres of wetlands (0.5 acres of tidal wetlands and 6.5 of forested wetlands) would be disturbed and/or removed under any of the action alternatives, all minimization measures and mitigation required under

permitting and existing state, local, and Navy and Air Force rules and regulations would be implemented.

- Limited impacts, if any, to wildlife resources would occur as the majority of construction takes place on already developed lands. Removal of forested acreage would displace some wildlife but adjacent forested areas would support relocation of wildlife to these areas.

All of the action alternatives would be, to the extent practicable, consistent with the enforceable policies of South Carolina's Coastal Management Program. A Draft Federal Consistency Determination was provided in the Draft EA. A Final Federal Consistency Determination was submitted to the South Carolina OCRM office on February 23, 2012 and concurrence received in April 2012. The Federal Consistency Determination and OCRM response can be found in Appendix C.

No Action Alternative

Under the No Action Alternative, NPTU facilities expansion would not occur. No parking areas would be constructed and no pier construction would be undertaken. Therefore, there would be no impacts to Coastal Zone Management if this alternative were adopted.

3.3 GEOLOGY, TOPOGRAPHY, SEISMOLOGY, AND SOILS

Geology refers to the study of the materials the earth is made of, the processes that act on those materials, and the products formed by these processes. Topography refers to an area's surface features and shape. Soil refers to the naturally occurring layers of minerals and/or organic matter that differ from the underlying parent material in physical, chemical, mineralogical, and morphological character because of natural processes. The following discussion for geology, topography, and seismology are for the JB CHS-W (including NPTU Charleston). The discussion of soils is specific to the area of development for the Proposed Action.

3.3.1 Affected Environment

Geology. The Cooper Marl geologic formation, formed 40 to 25 million years ago in the Oligocene Age, is found about 60 ft below ground surface and is composed of deposits of glauconite (a greenish mineral of the mica group) and foraminifera (marine protozoan having a linear, spiral, or concentric shell) that range from 30 to 200 ft in thickness. Santee Limestone underlies the Cooper Marl. The Santee Limestone is from the Eocene Age and is approximately 250 ft thick (NAVFAC 2003b).

Topography. JB CHS-W is located in the Atlantic Coastal Plain portion of South Carolina. Land elevations at NPTU Charleston range from mean sea level near the Cooper River to 10 ft above mean sea level farther inland. The area is composed of marine terraces that formed during the Pleistocene Period when sea levels were high. The surficial geology consists of thin marine sediment layers that have formed on the terraces. These flat terraces, between tidal areas, are suitable for development (NAVFAC 2003).

Seismology. NPTU Charleston is located within the Charleston Seismic Zone (Peterson *et al.* 2008). A magnitude 7.3 earthquake (in Richter Scale) occurred in the Charleston area in 1886 and other less intense earthquakes have occurred in the Charleston area in 1958, 1959, 1960, and 1967 (USGS 2011). The U.S.

Geological Survey estimates that, on average, design event earthquakes in the Charleston area appear to occur about every 400 to 500 years. According to the South Carolina Earthquake Education Program, changes in groundwater levels which affect the formation of earthquake features make it unlikely that a severe earthquake will occur soon in the Charleston area (SCEEP 2011).

Soils. Five different soils are found within the vicinity of NPTU Charleston: Bohicket association, Capers association, Chipley-Echaw complex, Goldsboro loamy sand, and Lynchburg fine sandy loam. Both the Bohicket and Capers associations have moderate potential for erosion, are very poorly drained, and are frequently flooded. Chipley-Echaw complex and Lynchburg fine sandy loam have low erosion potential, are somewhat poorly drained, and have no flooding potential. Goldsboro loamy sand has a low erosion potential, is moderately well drained, and has no flooding potential (NRCS 2011).

3.3.2 Environmental Consequences

Impacts to geology, topography, seismology, and soils would be considered adverse if the alternatives created a situation where: the geologic underpinning was altered, large scale earthmoving activities changed the local topography, buildings were established in areas incompatible with seismic conditions, or uncontrolled soil erosion and sedimentation occurred.

Action Alternatives

The geology at NPTU Charleston would not be affected by action alternatives because demolition and construction activities would not be to such an extent to change the underlying geology. The land for proposed development is located within an existing developed and flat area. Fill would be added prior to development and would have a minor impact to local topography. While establishing new facilities in a seismically hazardous area could not be avoided, seismic risk would not increase from existing conditions where facilities are already operating.

Soils at the NPTU Charleston would undergo temporary, short-term impacts during demolition and construction activities and long-term effects from facility and parking area establishment. To minimize these potential impacts during construction and demolition activities, erosion and sedimentation control techniques would be used to stabilize soils. These techniques include (but are not limited to) using vegetative covers (e.g., permanent seeding, groundcover) and installing silt fencing and sediment traps. In the long term, proper stormwater design and management (e.g., breaking runoff flow, detention ponds, and landscaping) would be implemented to decrease surface runoff and the associated risk of exposed soil erosion. Additional parking areas with impervious surfaces could also cause increased rates of stormwater runoff; however, DoD LID design requirements would minimize the potential for adverse impacts to soils.

No Action Alternative

Under the No Action Alternative, no construction or demolition activities would occur. As such, there would be no adverse impacts to geology, topography, seismology, and soils.

3.4 BIOLOGICAL RESOURCES

Biological resources include living, native, or naturalized plant and animal species, wildlife, and the habitats within which they occur. Habitat can be defined as the resources and conditions present in an area that produces occupancy of a plant or animal. For purposes of the EA, these resources are divided into two major categories: terrestrial and aquatic resources.

3.4.1 Affected Environment

For the purposes of this EA, the ROI for direct impacts to biological resources would comprise the area proposed for NPTU Charleston development and Cooper River shoreline where pier extension and upgrading would occur. Indirect impacts to migrating and more mobile species (both on land and aquatic) could be affected on a broader scale if there are major changes to habitat or migration patterns. This section separates analysis into terrestrial biology (vegetation and wildlife), aquatic resources (essential fish habitat and aquatic and marine wildlife), and threatened and endangered species (plant and wildlife species).

3.4.1.1 Terrestrial Biology

Vegetation. Vegetation within the area of proposed development consists of a mix of wetlands, forested lands, and maintained lawns. Wetland vegetation consists of both forested wetland vegetative species and salt marsh species. Forested wetland species generally are a mix of red maple, sweet gum, black gum, water oak, and occasional mix of loblolly pine. Salt marsh vegetation is generally dominated by smooth cordgrass with lesser components of needle rush (NAVFAC 2003b).

Wildlife. Wildlife found in the South Carolina outer coastal plain includes many species of birds (passerines, raptors, waterfowl, and wading birds), reptiles (alligators, snakes, and lizards) and amphibians (frogs, toads, and salamanders). Common mammalian species include white-tailed deer, bobcats, coyotes, foxes, raccoons, otters, rabbits, mink, squirrels, and a wide variety of small mammals (rats, mice, shrews, moles, and voles) (NAVFAC 2003b).

JB CHS-W also provides habitat for a large number of resident and transient migratory bird species, including neotropical migratory birds. Since 2000, JB CHS-W has conducted surveys to inventory migratory bird species; close to 60 species have been reported within base boundaries (NAVFAC 2003b). A wide variety of birds including sizable populations of raptors, wading birds, and waterfowl thrive within JB CHS-W boundaries. However, at NPTU Charleston, the area proposed for development primarily supports buildings and parking.

3.4.1.2 Aquatic Resources

Essential Fish Habitat. Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act, as amended, requires interagency coordination to further the conservation of federally managed fisheries and for each federal agency that may adversely affect EFH to consult with the NMFS and identify EFH. The Act defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The definition for EFH may include habitat for an individual species or an assemblage of species, whichever is appropriate within each Fisheries Management Plan (FMP). EFH must be identified and described for the fishery, and any adverse impacts on EFH must be minimized and mitigated to the extent practicable.

NPTU Charleston is located on the Cooper River. This river is a valuable fisheries resource and contributes to the local economy from the rich fin fisheries and shellfisheries. In the general vicinity of NPTU Charleston emergent wetlands, tidal creeks, unconsolidated bottom, and intertidal and subtidal mudflats occur; NMFS has identified two types of EFH located approximately 1,600 ft downstream of NPTU Charleston piers. These EFH are emergent wetlands and riverine ecosystems important to shrimp and the snapper/grouper complex fisheries.

Currently, periodic maintenance dredging occurs at JB CHS-W (USACE permit number 2009-00175-21R) on an as-needed basis to preclude silt build up and allow for continued mission readiness. Dredging activities and the approximate 111,700 sf of overwater shading from the piers, MTSs, and support barges discourage development of in-water EFH at NPTU Charleston.

Aquatic and Marine Wildlife. The Cooper River and its tributaries support a wide variety of fish species, including some game fish (e.g., trout, flounder, drum, and croaker). Freshwater species that are prominent are sunfish, bass, and catfish families. The Cooper River is an estuary or a transition zone between fresh and salt waters and is a rich, valuable natural resource (NAVFAC 2003b).

3.4.1.3 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 and subsequent amendments provide for the conservation of threatened and endangered species of animals and plants, and the habitats in which they are found. The ESA prohibits jeopardizing endangered and threatened species or adversely modifying critical habitats essential to their survival. Section 7 of the ESA requires consultation with the National Marine Fisheries Service (NMFS) and the USFWS to determine whether any endangered or threatened species under their jurisdiction may be affected by the Proposed Action or alternatives.

Berkeley County (where NPTU Charleston is located) supports or has the potential to support a number of federal and state listed plant and animal species (Table 3.4-1). Over the last 20 years, JB CHS-W has conducted various surveys for threatened and endangered plants, amphibians, reptiles, and mammals. Results of these surveys concluded that there were no threatened or endangered plants, amphibians, or reptiles observed resident on base (which includes NPTU Charleston). During a mammal survey, one Southeastern myotis (a bat species of Federal concern and state threatened species) was observed. While a red-cockaded woodpecker (RCW) survey identified one male RCW, no mating or nesting activities were observed (NAVFAC 2003b), and there is no habitat on NPTU Charleston to support RCW mating or nesting activities. However, highly mobile species such as the wood stork have been observed on a seasonal basis and there is habitat that can support several state amphibian, fish, and reptile species of concern.

Table 3.4-1 Threatened and Endangered Species and Species of Concern in Berkeley County

Species		Status		Potential Effects from Action Alternatives		
Common Name	**Scientific Name**	**USFWS[1]**	**SCDNR[2]**	**Alternatives 1, 3, and 5**	**Alternatives 2 and 4**	**No Action Alternative**
Amphibians and Reptiles*						
Flatwoods Salamander	*Ambystoma cinqulatum*	T	E	No Effect	No Effect	No Effect
Spotted Turtle	*Clemmys guttata*	No Designation	T	No Effect	No Effect	No Effect
Gopher Frog	*Rana capito*	No Designation	E	No Effect	No Effect	No Effect
Birds						
Bald Eagle	*Haliaeetus leucocephalus*	P	E	No Effect	No Effect	No Effect
Wood Stork	*Mycteria americana*	E	E	No Effect	No Effect	No Effect
Red-cockaded Woodpecker	*Picoides borealis*	E	E	No Effect	No Effect	No Effect
Swallow-tailed Kite	*Elanoides forficatus*	SC	E	No Effect	No Effect	No Effect
Least Tern	*Sterna antillarum*	No Designation	T	No Effect	No Effect	No Effect
Wilson's Plover	*Chararius wilsonia*	No Designation	T	No Effect	No Effect	No Effect
Glossy Ibis	*Plegadis falcinellus*	No Designation	T	No Effect	No Effect	No Effect
Mammals						
West Indian Manatee	*Trichechus manatus*	E	No Designation	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	No Effect
Rafinesque's Big-Eared Bat	*Corynorhinus rafinesquii*	SC	E	No Effect	No Effect	No Effect
Southeastern Myotis	*Myotis austroriparius*	SC	T	No Effect	No Effect	No Effect
Fish*						
Shortnose Sturgeon	*Acipenser brevirostrum*	E	E	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	No Effect
Atlantic Sturgeon	*Acipenser oxyrinchus*	E	No Designation	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	No Effect
Plants						
Canby's Dropwort	*Oxypolis canby*	E	No Designation	No Effect	No Effect	No Effect
Pondberry	*Lindera melissifolia*	E	No Designation	No Effect	No Effect	No Effect
Chaff-seed	*Schwalbea americana*	E	No Designation	No Effect	No Effect	No Effect

Source: [1]USFWS 2011. [2]SCDNR 2009.
Notes: T = Threatened; E = endangered; SC = Species of Concern; P=Protected through the Bald and Golden Eagle Protection Act (16 U.S.C. § 668-668c).
*Sea turtles and smalltooth sawfish, while found in Charleston County, are not found in Berkeley County and as such are not identified in this table.

At NPTU Charleston, there is, however, habitat in the Cooper River to support three threatened or endangered species—the West Indian Manatee, shortnose sturgeon, and Atlantic sturgeon. Manatees are migratory in South Carolina and begin their slow migration up the coast from Florida each spring when water temperatures rise into the upper 60s. They can be found in tidal rivers, estuaries, and near-shore marine waters (such as the Cooper River) throughout the summer months. As water temperatures cool, the manatees return to Florida in September and October (SCDNR 2010).

There appear to be populations of shortnose sturgeon and Atlantic sturgeon in the Cooper River (SCDNR 2011). Shortnose sturgeon typically hold along the freshwater/saltwater interface during the fall and winter months. During the late winter and early spring, spawning occurs in freshwater reaches of their natal rivers with eggs laid on hard bottom or rubble (NOAA 1998).

Atlantic sturgeon were federally listed as endangered in February 2012. The species is similar to the shortnose sturgeon and has significant habitat overlap. Like shortnose sturgeon, Atlantic sturgeon are anadramous and move into freshwater reaches of rivers to spawn. Spawning occurs in winter to early spring in freshwater over hard substrate or rubble. Atlantic sturgeon are thought to inhabit the Cooper River, though no larvae or juveniles have been captured. Population dynamics for Atlantic sturgeon are poorly understood in the Cooper River (SCDNR 2012).

No threatened or endangered species of sea turtles or smalltooth sawfish are found in the Cooper River in Berkeley County.

3.4.2 Environmental Consequences

Impacts to biological resources would be considered adverse if any of the action alternatives created a long term disruption, destruction, and/or take to a species, its habitat, or migration pattern. If adverse environmental impacts are identified, mitigation measures would be considered to reduce and control the impacts to within established limits or criteria.

3.4.2.1 Terrestrial Biology

Action Alternatives

Under any of the action alternatives building construction and demolition activities would disturb already developed and paved areas. Construction of parking and fencing would disturb and/or remove no more than 7 acres of wetlands (refer to Section 3.5 for discussion of wetland impacts). In terms of vegetation, the majority of the proposed parking and fencing development area is forested lands (NAVFAC 2003b). Given that much of the vegetation is not native and that removal of forested lands would not significantly impact its availability on a regional basis, none of the action alternatives would introduce adverse impacts. Upgrades to the NPTU power supply may require trimming of tree branches that extend into the existing utility corridor. There would be no tree clearing for power supply upgrades under the action alternatives. It is not anticipated that building construction or demolition activities would adversely impact wildlife species. The more mobile species would be able to relocate; however, the less mobile species could experience mortality.

Once NPTU Charleston reaches full staffing and student loading, it is unlikely that the increase in traffic would have long term or adverse impacts to vegetation or wildlife. No new roads would be introduced, and the current roads experience heavy travel at all hours of the day.

No Action Alternative

Under the No Action alternative, no construction or demolition would occur. As such, there would be no impacts to terrestrial biological resources other than those that exist under baseline conditions.

3.4.2.2 Aquatic Resources

Action Alternatives

The proposed construction at NPTU Charleston would have potential for minor impacts to aquatic resources under any action alternative. Short-term impacts would include pile driving and security fence installation, and long-term impacts from overwater shading by piers and MTSs, MTS operations, and continued maintenance dredging.

Essential Fish Habitat. Implementation of any of the action alternatives would result in the permanent filling and loss of non-tidal palustrine wetlands for parking area construction, impacts to estuarine wetlands from security fence construction, and impacts to estuarine unconsolidated bottom from pile driving and dredging. Impacts to EFH from wetland filling would be minimized by avoiding construction activities that involve wetland filling and dredging during times of year when fish are spawning. Construction impacts would be temporary. Permanent impacts would be minor since the fence line would not prohibit underwater movement of fish and marine organisms. Fish and marine organisms too large to pass through the chain link fence in the marsh area would be able to move around the fence since it terminates at the water’s edge along the Cooper River. The existing and planned expansion of the PSB is a floating barrier that does not restrict movement of fish, marine organism, or marine mammals. In consultation with NMFS HCD, the Navy will also ensure that a vegetated buffer of at least 75-ft is present between all estuarine emergent marsh and new parking areas and pedestrian walkways to avoid adverse indirect impacts to EFH. Chapter 5.0 outlines mitigation measures and Appendix F provides an EFH Assessment and associated consultation correspondence.

Aquatic and Marine Life. During pier construction anchors and chains for two equipment barges and possible mooring pilings, struts, or spuds for crane stabilization would be needed for about 5 months a year. These activities would introduce temporary overwater shading, a short-term increase in turbidity, and a minor temporary bottom impact from the anchors, chains, and moorings. These short-term, temporary impacts would not incur adverse or significant impacts to aquatic or marine life.

The Navy determined that no takes to marine mammals are likely when the Marine Mammal Observer Plan (Plan) is implemented during in-water work (the Marine Mammal Observer Plan is provided in Appendix G). This Plan outlines the procedures for monitoring and reporting activities in the project area during pile driving activities. Per consultation with NMFS, the Navy will: not conduct in-water work in the Cooper River between October 1 and March 30; undertake noise ramp-up procedures prior to pile-driving activities; not drive piles prior to May 1; and only drive steel piles between June 15 and August 30 (see Appendix A, Draft Environmental Assessment Responses, NMFS August 31, 2012 letter). In addition, trained marine mammal observers will look for dolphin activity within a 151-ft (46-meter) radius of the pier construction area during steel reinforced concrete pile-driving activities. Work will stop if marine mammals are observed within this distance and only restart once the mammal has moved outside the 151-ft safety radius. Marine mammals can avoid the pier construction area since there is about 1,000 ft to the opposite bank of the Cooper River, which provides an expansive width for marine mammals to traverse the river. In addition, other marine mammals including manatees, sea turtles, and smalltooth sawfish are included in the Marine Mammal Observation Plan.

Following construction, the piles could act as underwater structures that attract marine organisms. Piles act as hard substrate which can create habitat for sessile organisms (e.g., barnacles, oysters, etc.) which can in turn lead to underwater community development by creating a food source for higher trophic level crustaceans and fish. As for the PSB, 90 percent of the security fence occurs above water with only the floats (supporting the fence) submerged about 1.5 feet into the water surface. The PSB is secured to the river bottom at anchor points that are attached to the floats. There would be little opportunity for marine mammals to get entangled by the PSB since the majority of it floats above water.

The amount of permanent overwater shading that occurs from pier placement can limit the growth of submerged aquatic vegetation due to the insufficient sunlight. Under all action alternatives, some if not all of the support barges would be removed with their functions being replaced with onshore facilities. The permanent removal of the barges offsets the overwater shading generated from pier expansion. When compared to baseline, long-term impacts due to overwater shading would be reduced by approximately 34,000 sf under Alternatives 1 and 2, while Alternative 3 and 4 would only reduce shading by 25,000 sf. Alternative 5 would reduce overwater shading by 1,900 sf because the IX-519 would not be removed. While there is no EFH in the areas proposed for dredging, all alternatives would introduce a net reduction of overwater shading.

Another potential for long-term impacts would be from periodic maintenance dredging for MTS operations. Currently dredging activities, in agreement with SCDHEC, are suspended during the months of March through June so as not to affect spawning fish, when possible (SCDHEC 2010). There would be no adverse impacts to aquatic and marine resources if any of the action alternatives were implemented.

No Action Alternative

Under this alternative, overwater shading from piers, MTSs, and support barges would continue. EFH establishment would be discouraged by continued maintenance dredging in the Cooper River, but no EFH would be disturbed in the salt marsh. Overall, there would be no adverse impacts to aquatic resources if the No Action Alternative was adopted.

3.4.2.3 Threatened and Endangered Species

Action Alternatives

Under the action alternatives, just over 18 acres of land would be disturbed. However, no terrestrial threatened or endangered species or habitat is known to occur within this ROI (NAVFAC 2003b). Much of the land that would be disturbed is already developed and paved; the forested acreage does not support any of these sensitive species or their habitat; migratory and mobile terrestrial species would be temporarily displaced but the action would not adversely affect them in the long term.

USFWS concurred on March 20, 2012, with the Navy determination that the action alternatives may affect, but are not likely to adversely affect manatees from in-water construction activities, because Standard Manatee Guidelines will be followed (see Appendix A, Draft Environmental Assessment Responses [attachment to the USFWS March 20, 2012 letter]). The Navy will adhere to these guidelines and the Marine Mammal Observer Plan to avoid adverse effects to manatees.

NMFS concurred on August 31, 2012, with the Navy conclusion that the action alternatives may affect, but are not likely to adversely affect shortnose and Atlantic sturgeon with implementation of the Mitigation Plan (see Appendix A, Draft Environmental Assessment Responses [attachment to the NMFS August 31, 2012 letter]) and trained marine mammal observers. Both sturgeon species are known to use the freshwater/saltwater interface for foraging. This area is approximately 6 miles up-river of NPTU Charleston (SCDNR 2012). Therefore, both sturgeons only use the area of the Cooper River adjacent to NPTU Charleston for migration/movement purposes and not for foraging or spawning. Spawning for both species of sturgeon occurs in tidal freshwater, which is located over 6 miles north of NPTU Charleston. The Navy will not conduct in-water work (vibratory and impact pile driving) during sturgeon migration periods (October 1 through March 30), when the sturgeon are likely to be present in the Cooper River (NOAA 2006).

The Navy determined that no takes to sea turtles and smalltooth sawfish are likely since they are not expected to occur in the action area. However, as a precautionary measure the Navy will adhere to NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions (see Appendix A, Draft Environmental Assessment Responses [attachment to NMFS March 8, 2012 letter]) to avoid any adverse impacts.

In summary, in-water work may affect, but is unlikely to adversely affect Atlantic or shortnose sturgeons and West Indian manatees. In-water work would have no affect on sea turtles or smalltooth sawfish because these species are not present in the project area and any potential effects will be mitigated by implementing construction conditions outlined by NMFS in their March 8, 2012 response to the Draft EA (Appendix A). Chapter 5.0 outlines mitigation measures to avoid adverse impacts; the FONSI/FONPA reiterates these measures and a separate Mitigation Plan will be produced to ensure these measures are implemented.

No Action Alternative

Under the No Action Alternative there would be no impacts to threatened or endangered species.

3.5 WATER RESOURCES

Water resources include wetlands, floodplains, surface and storm waters, groundwater, and water quality. The Clean Water Act (CWA) of 1972 (PL 95-217), the Safe Drinking Water Act of 1972 (PL 93-523) and Amendments of 1986 (PL 99-339), and the Water Quality Act of 1987 (PL 100-4) are the primary federal laws protecting the nation's waters including lakes, rivers, aquifers, and wetlands. In addition, several applicable regulations and permits are in place to protect the quantity and quality of water resources in the U.S. These include: National Pollutant Discharge Elimination System (NPDES) Construction Activity General Permit (40 C.F.R. § 122-124); NPDES Industrial Permit and NPDES Municipal Separate Storm Sewer System Permit; USEPA, Subchapter D-Water Programs (40 C.F.R. § 100-145); and USEPA, Subchapter N-Effluent Guidelines and Standards (40 C.F.R. § 401-471). Please refer to section 3.11 for potential impacts to water resources emanating from NPTU training and operational activities.

3.5.1 Affected Environment

3.5.1.1 Wetlands

Wetlands are broadly considered "waters of the U.S." and are defined by the USACE as areas that are inundated and saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE 1987). Wetlands provide many important ecological functions, such as flood water retention and natural filtration of waterborne pollutants, as well as providing valuable habitat for a variety of wildlife.

In the vicinity of the NPTU Charleston there are two major wetland categories: estuarine and palustrine. Estuarine wetlands consist of tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have access (either open, partly obstructed, or sporadic) to the open ocean, and in which ocean water is at least occasionally diluted by fresh water runoff from land. Estuaries are extremely productive natural systems that provide spawning, nursery, and feeding habitats for many marine species. Both salt marsh and brackish marsh estuarine systems are present within the area of proposed development. Salt marsh areas are generally dominated by smooth cordgrass (*Spartina alternaflora*) in tidal marshes of the Cooper River and creeks, with lesser components of needle rush (*Juncus roemerianus*) depending on saltiness and elevation. Brackish marsh habitats are dominated by narrow-leafed cattail (*Tyhpa augustifolia*), rushes (primarily *Juncus roemerianus*), and bulrushes (*Scirpus spp.*). Sawgrass (*Cladium jamaicense*), giant cordrass (*Spartina cynosuroides*), arrowhead (*Sagittaria spp.*), pickerelweed (*Pontederia cordata*), marsh mallow (*Kosteletskya virginica*), and silverling (*Baccharis halimifolia*). Waxmyrtle is prevalent along the marsh edges.

Palustrine wetlands are systems that include non-tidal wetlands that are dominated by trees, shrubs, persistent emergent, emergent mosses or lichens. The palustrine system is used to group vegetated wetlands traditionally called swamps, bogs, and marshes. Palustrine systems within the proposed development area consist of both forested wetlands and palustrine emergent systems. Wetlands in the vicinity of NPTU Charleston are shown in Figure 3.5-1 and in detail in wetland survey maps included in Appendix E.

3.5.1.2 Floodplains

A floodplain is the flat or nearly flat land adjacent to a stream or river that stretches from the banks of the channel to the base of the enclosing topography and experiences flooding during periods of high discharge. Floodplains typically are described as areas likely to be inundated by a particular flood. For example, a flood that has a 1-percent chance of occurring in any 1 year is considered a 100-year floodplain. NPTU Charleston is located on the west bank of the Cooper River and as such is within the 100-year floodplain. The 100-year floodplain varies in elevation from approximately 8.5 ft to 10.5 ft above mean sea level (NAVFAC 2003b). Normal tides for the Cooper River and adjacent waters range from a minimum low of 1.1 ft to a maximum high of 6.3 ft.

3.5.1.3 Surface/Storm Water

Surface waters are defined as those that exist above the ground surface. JB CHS-W is found within the Cooper River watershed and NPTU Charleston is located on the west bank of the Cooper River, approximately 16 miles upstream from the Atlantic Ocean. JB CHS-W is bisected by two major creeks: Foster Creek to the north and Goose Creek to the south. Foster Creek empties into the Back River. Goose Creek and the Back River drain into the Cooper River, which ultimately joins with the Ashley River to form Charleston Harbor (refer to Figure 1-1).

Storm water results from rainfall or snowmelt that runs over the land surface and ultimately empties into a receiving water body. Management of storm water associated with construction activities, including infrastructure/lineal projects, is covered under SCDHEC NPDES Permit SC Regulation (SCR) 100000. Similar to soil resources, management of storm water associated with construction activities also requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The permittee (i.e., construction contractor) is required to develop and implement the SWPPP to reduce or minimize any impacts to water resources and to protect waterways from sedimentation due to eroding soil conditions. A notice of intent (NOI) for construction-related storm water discharge must be submitted to SCDHEC. BMPs, as specified by LID design guidelines, are required to control soil erosion, reduce the amount of runoff, and to prevent or minimize pollution of stormwater.

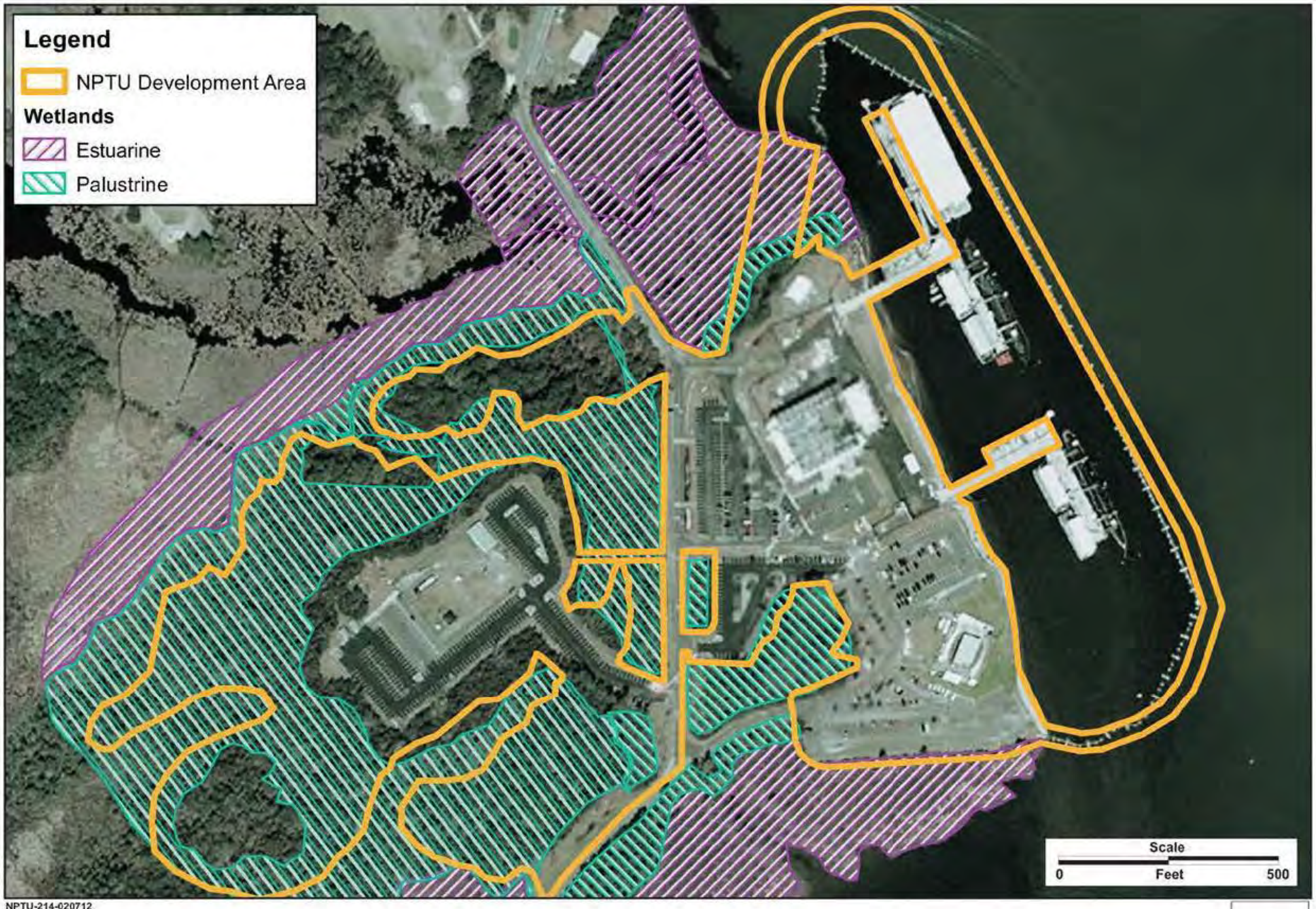

Figure 3.5-1 Water Resources within the Proposed Development Area

The goal of LID is to maintain or restore the natural hydrologic functions of a site to achieve natural resource protection objectives and fulfill environmental regulatory requirements. LID employs natural and built features that reduce the runoff rate, filter out its pollutants, and facilitate the infiltration of water into the ground. By reducing water pollution and increasing groundwater recharge, LID helps to improve the quality of receiving surface waters and stabilizes the flow rates of nearby streams. These measures include a series of integrated management practices to match the “pre-/post-" hydrologic conditions in the construction areas. Examples of BMPs that mitigate impervious surface include vegetated infiltration swales, dry detention basins, porous pavers, and bioretention cells (rain gardens) with native plantings.

Additionally, EO 13514 requires that all new construction, major renovations, or repairs and alteration of Federal buildings comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (DoD 2010b). Compliance includes reducing potable water consumption by a minimum of 50 percent over water consumed by conventional means and employing design and construction strategies that reduce stormwater runoff. Furthermore, Section 438 of the Energy Independence and Security Act of 2007 requires that any development or redevelopment project involving a Federal facility with a footprint exceeding 5,000 sf shall use site planning, design, construction, and maintenance strategies in order to maintain or restore the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow. Compliance with this requirement can be met through the implementation of LID technologies.

In terms of storm water and sewer discharges from day-to-day operational activities, JB CHS-W is regulated as a small municipal separate storm sewer system (SMS4) under permit SCR 03000 Currently, NPTU Charleston’s controlled drainage is managed by structures that capture the runoff from impervious surfaces, such as buildings and parking lots, and discharges into a central detention area then into adjacent waterways. Uncontrolled stormwater flows into local waterways that eventually drain into the Cooper River.

3.5.1.4 Groundwater

Groundwater in the vicinity of JB CHS-W is contained within six major aquifer systems. These are the Middendorf, Black Creek, Pee Dee, Black Mingo, Tertiary Limestone, and surficial aquifer systems. The most important aquifers for public water supply are the Black Creek, Black Mingo, and the Tertiary Limestone aquifers. However, since potable water is provided to the Installation by the North Charleston Public Services Authority, no public water supply wells are operated within the project area.

3.5.1.5 Water Quality

SCDHEC classifies bodies of water based on their desired usage and whether the body of water complies with those classification parameters. For salt water bodies, these classifications are as follows:

- Class Outstanding Resource Waters (ORW) – salt waters that constitute an outstanding recreational or ecological resource;
- Class Shellfish Harvesting (SFH) –tidal salt waters protected for shellfish harvesting, and are also suitable for SA and SB uses;

- Class Salt water "A" (SA) –tidal salt waters suitable for primary and secondary contact recreation, crabbing, and fishing. These waters are not protected for harvesting clams, mussels, or oysters for market purposes or human consumption. The waters are suitable for the survival and propagation of a balanced indigenous aquatic community of marine fauna and flora. Class SA waters must maintain a daily dissolved oxygen (DO) average of not less than 5.0 milligrams per milliliter, with a minimum low measurement of 4.0 milligrams per milliliter; and
- Class Salt water "B" (SB) – tidal salt waters suitable for the same uses as SA, but SB waters have DO limitations. SB waters must maintain DO daily averages of 4.0 milligrams per milliliter (SCDHEC 2008).

The Cooper River is classified as an SB water body. While the area along the Cooper River immediately adjacent to NPTU Charleston has not been identified as an impaired waterway, the Cooper River itself is located in a larger watershed where South Carolina has established a Total Maximum Daily Load (TMDL) for DO (SCDHEC 2005).

3.5.2 Environmental Consequences

Water resources would be adversely impacted if there is: a direct discharge of fill material or indirect erosion or sedimentation into wetlands that results in degradation of the local ecosystem; adverse modification of the floodplain; uncontrolled erosion and sedimentation due to stormwater runoff; and pollution discharged into state-impaired water bodies to exceed TMDL levels.

3.5.2.1 Wetlands

NPTU Charleston is bordered by estuarine wetlands to the north, along a small tributary of the Cooper River (NAVFAC 2003b). In September 2011, a wetland survey of NPTU Charleston was undertaken and submitted to USACE for Jurisdictional Determination. USACE issued a Jurisdictional Determination confirmation letter on April 2, 2012. From the survey, it was found that palustrine/palustrine emergent forested areas occur in lands proposed for parking spaces; in the area proposed for the new security fence, the wetlands were classified primarily as estuarine intertidal (Appendix E provides the Wetlands Survey Report and USACE Jurisdictional Determination Confirmation letter). To offset wetland impacts, the Navy would purchase the appropriate wetland credits from existing, local banks, as specified during the permitting process; a Mitigation Plan detailing components, execution strategy, organizational responsibilities, and schedule for mitigation wetland impacts has been drafted and pre-coordinated with USACE, SCDHEC, and existing wetland bank owners and is programmed for funding along with the proposed action. The Mitigation Plan will be completed shortly after the EA is finalized. Currently, it is anticipated that the Navy has the potential to purchase up to 70 wetland credits; however, the specific credit amounts, types, and final mitigating actions will be established during the permitting process with USACE and SC OCRM after parking areas, pier, and mooring designs are finalized. See Chapter 5.0 for a summary of wetland mitigation measures the Navy will undertake to avoid adverse impacts to wetlands.

The following wetland protection measures as outlined in the “Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency, The Determination of Mitigation under the CWA Section 404(b)(1) Guidelines” would be followed:

- Avoidance – avoid potential impacts to the maximum extent practicable;
- Minimization – take appropriate and practicable steps to minimize the adverse impacts (e.g., limit the anticipated impact to an area of the wetland with lesser value than other areas, or reduce the actual size of the impacted area); and
- Compensatory mitigation – take appropriate and practicable compensatory mitigation action for unavoidable adverse impacts that remain after all appropriate and practicable minimization has been made (e.g., create a new wetland area, restore existing degraded wetland, or enhance low-value wetland.

Because there is no other practicable alternative, adverse impacts to wetlands would be mitigated.

Alternatives 1, 3, and 5

Impacts to wetlands under Alternatives 1, 3, and 5 would be the same; a total of 7 acres (0.5 acres for security fencing and 6.5 for parking expansion). Figure 3.5-1 illustrates potential wetland impacts under these three alternatives (refer to Table 2-1). Every effort would be taken during the design phase to avoid, to the maximum extent practicable, adverse impacts to wetlands. For example, using a boardwalk over wetlands rather than filling and paving wetlands to construct a walkway. However, all wetlands cannot be avoided and Section 404 Clean Water Act permitting would be obtained and the required compliance with USACE Mitigation Guidelines and the Federal Mitigation Rule would be undertaken. To offset wetland impacts, the Navy would purchase the appropriate wetland credits from existing, local banks; a Mitigation Plan detailing components, execution strategy, organizational responsibilities, and schedule for mitigation wetland impacts will be completed shortly after the EA is finalized.

Alternatives 2 and 4

Under these action alternatives, a total of 5 acres (0.5 acres for security fencing and 4.5 for parking expansion) of wetlands would be disturbed from construction of parking areas and security fencing (refer to Table 2-1). The reduced impact to wetlands is due to constructing a parking structure, rather than having all surface parking. As is found under Alternatives 1, 3, and 5, wetland impacts cannot be avoided and Section 404 Clean Water Act permitting would be obtained and the required compliance with USACE Mitigation Guidelines and the Federal Mitigation Rule would be undertaken. To offset wetland impacts, the Navy would purchase the appropriate wetland credits from existing, local banks; a Mitigation Plan detailing components, execution strategy, organizational responsibilities, and schedule for mitigation wetland impacts will be completed shortly after the EA is finalized.

No Action Alternative

Under the No Action Alternative, no construction or demolition activities would occur. No new parking areas would be constructed and security fencing would not be upgraded; however, student loading would increase and long-term strains on facilities and parking would be incurred. While there would be strain on these facilities, there would be no impacts to wetlands if the No Action Alternative were implemented.

3.5.2.2 Floodplains

EO 11988, *Floodplain Management* requires federal agencies to avoid to the extent practicable any possible long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Due to the unique needs of NPTU Charleston (security and high tempo of training), the training/academic/support facilities must be located in proximity to the MTSs. As such, and as outlined in Chapter 2, the only practicable alternative is to construct these facilities within the floodplain.

Alternatives 1, 3, and 5

Under any of these three action alternatives, close to 18 acres would be developed within the 100-year floodplain (10 acres of developed land and 8 acres of undeveloped land). Development would include approximately 68,000 cy of clean fill material from an off-base source area as part of the construction activity. According to EO 11988, in situations where alternatives are impractical, the agency must minimize potential harm to or within the floodplain and take appropriate steps to notify the public. To avoid significant adverse impacts, new construction would be designed taking into account floodplain management strategies, such as elevating the foundation; locating electrical, heating, ventilation, plumbing and air conditioning equipment to prevent water from entering or accumulating within the equipment; designing and adequately anchoring the structure to prevent flotation; as well as DoD LID policies. By implementing these design measures, new construction would not create or worsen existing floodplain conditions or impair the ability of the floodplain to buffer the effects of floods. The small proportion of floodplains affected by any of the three alternatives would be minor compared to the greater Cooper River floodplain. Therefore, none of the three alternatives would likely endanger people or structures for flood impacts.

Alternatives 2 and 4

Under Alternatives 2 and 4, close to 16 acres would be developed within the 100-year floodplain; and cannot be avoided. Again, similar to the other three alternatives, implementing design measures (as presented above) into new construction, no new flood conditions would occur to likely endanger people or structures.

No Action Alternative

Under the No Action Alternative, no construction or demolition would occur. Student loading would increase and long-term strains on facilities and parking would be incurred. However, under this alternative, no changes from existing conditions to floodplains would occur.

3.5.2.3 Surface/Storm Water

Action Alternatives

There would be minor surface water impacts at pier X-Ray North; however, the permanent extension would not adversely impact Cooper River surface waters on a short- or long-term basis.

In terms of storm water, JB CHS-W would ensure that all required stormwater protection measures, BMPs, and minimization efforts were employed by the construction contractor(s) to eliminate adverse pollutant runoff, minimize soil erosion, and protect against undue sedimentation of adjacent wetlands or surface water bodies to avoid short-term direct and indirect impacts to storm water. Once operational, additional impervious surface created at NPTU Charleston would be handled through traditional stormwater engineering controls (e.g., buildings with gutters, culvert/channels directing stormwater to detention basins) to avoid long-term impacts to water quality. JB CHS-W would update their existing base SWPPP to address these new facilities and continue to adhere to its SWPPP provisions. Additionally, per EO 13514, the Navy would comply with DoD LID policies to minimize adverse impacts to local hydrology. By applying these measures, it is not anticipated that there would be any adverse impacts (short or long term) on surface or storm water if any of the action alternatives were chosen for implementation.

No Action Alternative

Under the No Action Alternative, NPTU Charleston expansion would not occur; therefore, no impacts to surface water or storm water are anticipated.

3.5.2.4 Groundwater

Action Alternatives

No impacts to groundwater or groundwater quality are anticipated under any of the action alternatives. No public supply wells exist within the areas proposed for development which eliminates the risk of potential contamination of a public water supply during development. Since development would be planned to occur in upland areas, it is unlikely that groundwater would be encountered during site excavation and development, except in wetland areas (see above for impacts to wetlands).

No Action Alternative

Under the No Action Alternative, NPTU Charleston expansion would not occur; therefore there would be no impacts to groundwater.

3.5.2.5 Water Quality

Action Alternatives

Under any of the action alternatives, all federal, state, and local construction permits would be acquired and minimizations measures followed to ensure that sedimentation and erosion of exposed soils would be minimized. Construction activities and dredging would create temporary increases in turbidity. Loss of wetlands from filling will cause a longer impact due to loss of filtering and retention qualities. However, the use of temporary BMPs and permanent stormwater controls will minimize the impact and allow the water quality to be restored to existing levels. The newer MTSs and the temporary addition of a third MTS at NPTU Charleston during the peak transition time (FY 2020 – 2022) would slightly increase the thermal discharge into the Cooper River from baseline. This increase is estimated to be 0.09 degrees Fahrenheit, well below the regulatory limit of 1.5 degrees Fahrenheit and within the current mixing zone authorized under the state discharge permit (see section 3.11.5). No increased impact to water quality is expected.

Once constructed and operational, all facilities would be added to existing base permits to ensure compliance with state and local NPDES and clean water regulations and ordinances. As such, surface water quality would not be adversely affected if any one of the action alternatives were adopted for implementation.

No Action Alternative

Under the No Action Alternative, no construction or demolition would occur. Because no ground disturbance would occur, there would be only limited potential for impacts to surface water quality under the No Action Alternative. Runoff would continue to be managed by the existing stormwater infrastructure on NPTU Charleston.

3.6 SOCIOECONOMICS

Socioeconomics describes the basic attributes and resources associated with the human environment, particularly population, housing, and economic activity. Economic activity generally encompasses employment, personal income, and industrial growth. There are no governing regulations with regard to socioeconomics.

The ROI for socioeconomics is defined as the area in which the principal effects arising from implementation of the Proposed Action are likely to occur. For the purposes of this EA, the ROI for socioeconomics is the community within the Berkeley-Charleston-Dorchester Region (BCD Region), which comprises Berkeley, Charleston, and Dorchester Counties in SC. Specifically, NPTU Charleston lies completely within Census Tract 207.03, along the eastern boundary of the tract.

In 2000, according to the BCD Council of Governments report *Commuting Patterns in the Berkeley Charleston Dorchester Region*, 66 percent of people working in Berkeley County lived in Berkeley County, 16 percent lived in Charleston County, and 13 percent lived in Dorchester County, leaving only 5 percent living outside the BCD Region. The data indicated a minor decrease in the percentage of Berkeley County workers living outside the BCD Region compared to 1990, when 6 percent lived outside the region (BCDCOG 2005a). Similar level of detail is not yet available from the 2010 Census.

3.6.1 Affected Environment

The principal population centers in the vicinity of NPTU Charleston are the Cities of Charleston, Goose Creek, and Hanahan. In framing existing conditions for the socioeconomic analyses, this section analyzes and compares the demographics and economic activity of Census Tract 207.03, Berkeley County, the BCD Region, and the Cities of Charleston, Goose Creek, and Hanahan, to State of South Carolina demographics and economic activity.

3.6.1.1 Demographics

Table 3.6-1 presents 2005 to 2009 American Community Survey population figures for Census Tract 207.03; the Cities of Charleston, Goose Creek, and Hanahan; Berkeley, Charleston, and Dorchester Counties; the BCD Region; and SC. These data represent population estimates from January 1, 2005 through December 31, 2009. NPTU Charleston and Census Tract 207.03 are located within the City of Goose Creek, which has an estimated population of 36,049. The City of Hanahan is located to the west with a population of 15,293, and the City of Charleston, the largest city in the BCD Region and the second largest city in South Carolina, is located to the south with a population of 112,349.

Table 3.6-1 Estimated Population

Jurisdiction	Population	Percent of BCD Region Population
Census Tract 207.03	5,233	0.8
City of Goose Creek	36,049	5.7
City of Hanahan	15,293	2.4
City of Charleston	112,349	17.8
Berkeley County	163,328	25.9
Charleston County	345,714	54.7
Dorchester County	122,442	19.4
BCD Region	**631,484**	**100.0**
South Carolina	4,416,867	NA

Source: U.S. Census Bureau 2011, 2005-2009 American Community Survey.
Note: NA indicates that the estimate is not applicable or not available.

In the ROI, population projections to 2025 indicate that the area will experience a rate of growth exceeding that of the region and the state (Table 3.6-2).

Table 3.6-2 Population Projections

Jurisdiction	Projection				Percent Change		
	2010	2015	2020	2025	2010-2015	2015-2020	2020-2025
Berkeley County	162,370	172,940	183,520	194,080	6.5	6.1	5.8
Charleston County	339,140	347,910	356,680	365,450	2.6	2.5	2.5
Dorchester County	122,170	131,530	140,900	150,260	7.7	7.1	6.6
BCD Region	**623,680**	**652,380**	**681,100**	**709,790**	**4.6**	**4.4**	**4.2**
South Carolina	4,486,740	4,717,890	4,949,090	5,180,290	5.2	4.9	4.7

Source: South Carolina Budget and Control Board 2011, South Carolina Community Profiles.
Note: The population projections were calculated by the South Carolina Budget and Control Board, Office of Research and Statistics, based on the U.S. Census Bureau 2000 Census and 2007 population estimates. The projections are not directly comparable to the 2005-2009 American Community Survey population estimates provided in the previous table.

In 2002, the total loading for NWS Charleston (prior to it becoming a Joint Base), including all tenants, was 10,280, comprising 5,792 military, 2,951 civilian, and 1,537 contractors (NWS Charleston 2002). NPTU Charleston had the second largest loading, employing close to 16 percent of this total.

3.6.1.2 Economics

According to a military economic impact study performed by the Center for Business Research of the Charleston Metro Chamber of Commerce, JB CHS-W is the single largest employer in the BCD Region, employing 20,172 active duty, reserve, and civilian personnel (Charleston Metro Chamber of Commerce 2010a, b). Spending of payroll dollars and direct spending by the base on services and supplies added an additional 13,629 jobs to the economy, for an estimated total of 33,801 jobs. The study found that JB CHS-W payrolls, total compensation, and spending had an annual economic impact to the region's economy of $4.36 billion.

For Census Tract 207.03 an estimated 3,257 persons, 16 years and older, were in the overall labor work force (see Table 3.6-3). Of those persons, approximately 77 percent, or an estimated 2,507 persons, were employed in the armed forces. In Goose Creek, the BCD Region, and the state, the number of workers in the armed forces was lower at 15.3 percent, 2.6 percent, and 1.6 percent, respectively. This high proportion was primarily due to the fact that JB CHS-W comprises most of the geographic area found within this particular census tract and indicative of the importance of the base to local employment.

Table 3.6-3 Employment Status

Jurisdiction	Labor Force 16 Years and Over	Armed Forces	Civilian Labor Force	Employed	Percent Unemployed
Census Tract 207.03	3,257	2,507	750	681	9.2
City of Goose Creek	20,279	3,098	17,181	16,013	6.8
City of Hanahan	7,825	125	7,700	7,154	7.1
City of Charleston	61,622	496	61,126	57,400	6.1
Berkeley County	85,122	4,174	80,948	74,850	7.5
Charleston County	184,745	2,988	181,757	168,789	7.1
Dorchester County	62,583	1,321	61,262	56,722	7.4
BCD Region	**332,450**	**8,483**	**323,967**	**300,361**	**7.3**
South Carolina	2,188,561	35,665	2,152,896	1,971,789	8.4

Source: U.S. Census Bureau 2011, 2005-2009 American Community Survey.

The estimated unemployment rate for Census Tract 207.03 was 9.2 percent. This estimated unemployment rate was higher than the estimated rates for each of the other BCD jurisdictions, the region as a whole, and the state.

Table 3.6-4 shows that public administration was the largest employment sector in Census Tract 207.03, employing 26.1 percent of the civilian labor force or an estimated 178 persons. The second largest employment sector was educational services, and health care and social assistance at 15.4 percent or 105 persons. In comparison, education services, and health care and social assistance was the largest employment sector in Goose Creek, Berkeley County, and the BCD Region as a whole, followed by retail trade.

Table 3.6-4 Employment by Industry - percent

Industry	Census Tract 207.03	City of Goose Creek	Berkeley County	BCD Region
Agriculture, forestry, fishing and hunting, and mining	0.0	0.0	0.5	0.5
Construction	2.8	6.1	10.4	8.9
Manufacturing	2.6	10.2	12.5	8.6
Wholesale trade	0.0	0.8	2.4	2.9
Retail trade	13.1	14.1	12.8	12.3
Transportation and warehousing, and utilities	3.7	5.7	7.4	5.8
Information	1.6	2.0	1.9	2.2
Finance and insurance, and real estate and rental and leasing	8.8	6.4	5.3	6.0
Professional, scientific, and management, and administrative and waste management services	4.6	13.0	10.7	11.5
Educational services, and health care and social assistance	15.4	20.3	16.3	20.2
Arts, entertainment, and recreation, and accommodation and food services	13.8	8.2	8.5	10.8
Other services, except public administration	7.5	4.9	4.9	4.7
Public administration	26.1	8.4	6.3	5.7

Source: U.S. Census Bureau 2011, 2005-2009 American Community Survey.

From January 1, 2005 through December 31, 2009, the estimated median household income in Census Tract 207.03 was $42,102, slightly lower than the South Carolina estimated median of $43,572 (Table 3.6-5). The Census Tract 207.03 estimated median was substantively lower than the estimated median household incomes of other jurisdictions within the BCD Region – notably 28.5 percent lower than the Goose Creek estimated median and 14.6 percent lower than the Berkeley County estimated median.

Table 3.6-5 Income and Poverty

Jurisdiction	Median Household Income ($)	Median Family Income ($)
Census Tract 207.03	42,102	42,536
City of Goose Creek	58,915	62,219
City of Hanahan	47,294	54,190
City of Charleston	47,799	66,168
Berkeley County	49,286	55,608
Charleston County	47,770	60,168
Dorchester County	54,139	62,431
BCD Region	**NA**	**NA**
South Carolina	43,572	53,707

Source: U.S. Census Bureau 2011, 2005-2009 American Community Survey.
Note: NA indicates that the estimate is not applicable or not available.

As the table above depicts, the estimated median family income for the census tract was lower than the estimated median for all other jurisdictions, the region as a whole, and the state. The lower estimated median household and family incomes for Census Tract 207.03 likely reflects earnings from military personnel; their salaries do not reflect benefits such as housing allowances, military-provided medical care, or the ability to purchase goods at lower prices at military exchanges.

3.6.1.3 Housing

With the exception of Census Tract 207.03, housing occupancy and vacancy rates are relatively consistent between the individual jurisdictions comprising the BCD Region and the Region as a whole, as shown in Table 3.6-6. Occupancy and vacancy rates in the Region are also generally consistent with those for the state of South Carolina. The higher rate of vacancy in Census Tract 207.03 (51.6 percent) is likely accounted for by the predominance of military housing on JB CHS-W, which comprises most of the geographical area within the census tract.

Table 3.6-6 Housing Occupancy

Jurisdiction	Total Housing Units	Percent	
		Occupied Housing Units	Vacant Housing Units
Census Tract 207.03	1,948	48.4	51.6
City of Goose Creek	13,032	85.0	15.0
City of Hanahan	6,361	88.5	11.5
City of Charleston	55,362	86.5	13.5
Berkeley County	65,462	85.9	14.1
Charleston County	168,567	82.9	17.1
Dorchester County	46,794	91.2	8.8
BCD Region	280,823	85.0	15.0
South Carolina	2,020,422	83.8	16.2

Source: U.S. Census Bureau 2011, 2005 – 2009 American Community Survey.

As the most populous county in the region, Charleston also has the highest number of housing units (55,362). The City of Hanahan has the fewest (6,361) (excluding Census Tract 207.03), corresponding to its smaller proportion of the regional population. Dorchester County has the lowest rate of vacancy (8.8 percent) in comparison to the individual jurisdictions, and the BCD Region as a whole at 15.0 percent.

Similar to the state, housing in the individual jurisdictions and the overall BCD Region is predominantly composed of single-family homes, as shown in Table 3.6-7. Again, the exception to this is Census Tract 207.03, which likely consists of multi-unit housing facilities on JB CHS-W. However, the BCD Region as a whole, and the majority of jurisdictions in the region, contain substantial percentages of housing with 2 to 9 dwelling units. The Cities of Hanahan (12.2 percent) and Charleston (17.2 percent), as well as Charleston County (10.3 percent) have housing with 10 or more dwelling units at rates greater than the BCD Region (8.2 percent) or the state (6.6 percent). Mobile homes comprise nearly 15 percent of housing in Dorchester and 23 percent in Berkeley counties, while the frequency of mobile homes in the majority of jurisdictions and the overall BCD Region (12.2 percent) is lower than the state (18.1 percent) as a whole.

Table 3.6-7 Units in Housing Structure

Jurisdiction	Total Housing Units	Percent				
		Single Unit, Attached/Detached	2-9 Units	10 or More Units	Mobile Home	Other
City of Goose Creek	13,032	77.6	14.7	5.1	2.6	0
City of Hanahan	6,361	63.8	18.4	12.2	5.6	0
City of Charleston	55,362	55.4	26.1	17.2	1.2	0.1
Berkeley County	65,462	62.9	9.3	5.4	22.4	0.04
Charleston County	168,567	62.6	19.5	10.3	7.6	0.1

Table 3.6-7 Units in Housing Structure

Jurisdiction	Total Housing Units	Percent				
		Single Unit, Attached/Detached	2-9 Units	10 or More Units	Mobile Home	Other
Dorchester County	46,794	70.5	10.2	4.6	14.7	0
BCD Region	**280,823**	**64.0**	**15.5**	**8.2**	**12.2**	**0.1**
South Carolina	2,020,422	64.8	10.4	6.6	18.1	0.1

Source: U.S. Census Bureau 2011, 2005 – 2009 American Community Survey.
Note: Category "Other" includes boat, van, recreational vehicle, etc.

As shown in Table 3.6-8, homeowners occupy the majority of housing in the individual jurisdictions, the BCD Region (66.1 percent), and South Carolina (70.3 percent). With the exception of Dorchester County at 25.2 percent, renters are present more frequently throughout the separate jurisdictions and the BCD Region (34.0 percent) when compared to the state (29.7 percent). The frequency of renters is highest in the City of Charleston (38.6 percent), which also has the highest rate of multi-unit housing structures in the region, followed by the City of Hanahan (39.4 percent) and Charleston County (38.6 percent), which also have higher proportions of multi-unit housing in comparison to other jurisdictions in the region.

Table 3.6-8 Tenure of Occupied Housing Units

Jurisdiction	Occupied Housing Units	Percent		Average Household Size	
		Owner-occupied	Renter-occupied	Owner-occupied	Renter-occupied
Census Tract 207.03	n/a	n/a	n/a	n/a	n/a
City of Goose Creek	11,072	69.9	30.1	3.00	3.1
City of Hanahan	5,628	60.6	39.4	2.9	2.5
City of Charleston	47,868	54.3	45.7	2.4	2.1
Berkeley County	56,203	71.0	29.0	2.8	2.8
Charleston County	139,754	61.4	38.6	2.5	2.3
Dorchester County	42,675	74.8	25.2	2.9	2.7
BCD Region	**238,632**	**66.1**	**34.0**	**2.7**	**2.6**
South Carolina	1,693,388	70.3	29.7	2.6	2.4

Source: U.S. Census Bureau 2011, 2005 – 2009 American Community Survey.

Most jurisdictions in the BCD Region experienced strong residential growth between 1960 and 1989 (Table 3.6-9). During that same time period, housing construction rates in the Cities of Goose Creek (51.4 percent) and Hanahan (55.3 percent), and the Counties of Berkeley (51.0 percent) and Dorchester (48.4 percent) exceeded those of the BCD Region (47.2 percent) and the state of South Carolina (45.3 percent). Since 1990, housing construction rates, however, have declined to various extents in all jurisdictions, with rates in the Cities of Hanahan (25.5 percent) and Charleston (33.9 percent), and Charleston County (33.4 percent) falling below the pace of both the BCD Region (36.7 percent) and the state (36.7 percent). Meanwhile, the City of Goose Creek (43.4 percent) and Berkeley (40.6 percent) and Dorchester (43.2 percent) counties have retained building rates above 40 percent, placing them above the pace of housing construction in the BCD Region and the state since 1990.

Table 3.6-9 Housing Unit Period of Construction

Jurisdiction	Total Housing Units	Before 1960	1960 – 1989	Since 1990
Census Tract 207.03	1,948	10.7	76.4	12.9
City of Goose Creek	13,032	5.2	51.4	43.4
City of Hanahan	6,361	19.2	55.3	25.5
City of Charleston	55,362	29.5	36.6	33.9
Berkeley County	65,462	8.4	51.0	40.6
Charleston County	168,567	21.2	45.5	33.4
Dorchester County	46,794	8.5	48.4	43.2
BCD Region	**280,823**	**16.1**	**47.2**	**36.7**
South Carolina	2,020,422	18.0	45.3	36.7

Source: U.S. Census Bureau 2011, 2005 – 2009 American Community Survey.

The majority of housing stock in the BCD Region and its individual jurisdictions is valued under $300,000, as shown in Table 3.6-10. Regionally, 37.2 percent of housing stock is valued between $150,000 and $300,000; only Berkeley (36.0 percent) and Charleston (35.5 percent) counties have lower proportions of housing valued in that range. In contrast to the state (43.7 percent), 28.0 percent of the BCD Region's housing falls in the $50,000 to $149,999 range. Only the City (13 percent) and County (21.3 percent) of Charleston have a lower percentage of housing in the $50,000 to $149,999 range than the Region or its individual jurisdictions. Conversely, the City (21.9 percent) and County (19.1 percent) of Charleston also have the highest percentages of housing valued between $300,000 and $499,999, and above $500,000 (19.0 percent and 17.9 percent, respectively). Dorchester County is the only other jurisdiction in the BCD Region with more than 10 percent of homes valued between $300,000 and $499,999; all other jurisdictions have less than 5 percent of their homes valued above $500,000.

Table 3.6-10 Housing Value

Jurisdiction	Less than $50,000	$50,000 - $149,000	$150,000 - $299,999	$300,000 - $499,999	$500,000 & above
Census Tract 207.03	n/a	n/a	n/a	n/a	n/a
City of Goose Creek	3.7	31.7	54.0	8.7	1.7
City of Hanahan	7.4	33.4	50.2	6.7	2.4
City of Charleston	2.8	13.0	44.0	21.9	19.0
Berkeley County	14.5	39.1	36.0	6.6	3.8
Charleston County	6.3	21.3	35.5	19.1	17.9
Dorchester County	10.7	32.2	43.3	10.3	3.5
BCD Region	**9.3**	**28.0**	**37.2**	**14.1**	**11.4**
South Carolina	14.4	43.7	28.0	8.6	5.2

Source: U.S. Census Bureau 2011, 2005 – 2009 American Community Survey.

Table 3.6-11 presents future housing projections to the year 2030 for the BCD Region and its individual counties, as discussed in BCD Council of Governments' (BCDCOG) *2003 – 2030 Population, Housing, and Employment Projections for the Berkeley Charleston Dorchester Region* (BCDCOG 2003). Dorchester (25.5 percent) and Berkeley (23.5 percent) counties are expected to experience the largest increases in housing stock; with already twice as many housing units as either of those counties individually, Charleston County's housing stock is projected to increase at a somewhat slower rate of 17.0 percent.

Table 3.6-11 Projected New Housing Units

Jurisdiction	Total Housing Units (2005 – 2009 ACS Estimates)	2030 Total Housing Units (BCDCOG Projection)	Projected Change 2010 – 2030 (Estimate)
Census Tract 207.03	1,948	n/a	n/a
City of Goose Creek	13,032	n/a	n/a
City of Hanahan	6,361	n/a	n/a
City of Charleston	55,362	n/a	n/a
Berkeley County	65,462	80,814	23.5
Charleston County	168,567	197,209	17.0
Dorchester County	46,794	58,739	25.5
BCD Region	**280,823**	**336,762**	**19.9**
South Carolina	n/a	n/a	n/a

Source: U.S. Census Bureau 2011, 2005 – 2009 American Community Survey; BCDCOG 2004.

In light of the nationwide economic downturn, housing construction in the near term may not occur in the BCD Region at these rates. However, it can be reasonably assumed that the housing market will continue to meet demand in an active housing market in a growing metropolitan area with large military bases as the primary economic driver.

3.6.2 Environmental Consequences

The threshold for significance for socioeconomics would be met if the alternatives were to adversely impact population, job availability, alter demographic profiles, or alter typical industry or economic makeup of the affected environment.

Action Alternatives

3.6.2.1 Demographics

Increased staffing and student throughput would result in a long-term increase to employment in the BCD Region overall. Under any of the action alternatives, during the peak transition period (from FY20 to FY22), NPTU Charleston would receive 1,443 additional assigned students and personnel. Table 3.6-12 provides the breakout of students, as well as Navy and civilian staff. This would represent, on a short-term basis, a 77 percent increase in assigned students and staff. Once the transition is completed, there would be a long-term increase of 282 students and 290 staff, for an overall 31 percent increase in assigned students and staff when compared to baseline.

Table 3.6-12 Comparison of NPTU Charleston Assigned Personnel for Baseline, Peak Transition, and Long Term

Category	Baseline	Peak Transition (FY20 to FY22)		Long Term (FY23 and Beyond)	
	Total Assigned	*Total Assigned*	*Difference Compared to Baseline*	*Total Assigned*	*Difference Compared to Baseline*
Students	840	1,587	+747	1,122	+282
Navy Staff	754	1,321	+567	1,001	+247
Civilian Staff	268	397	+129	311	+43
TOTAL	**1,862**	**3,305**	**+1,443**	**2,434**	**+572**

3.6.2.2 Economics

Any of the action alternatives would result in both short- and long-term economic benefits for the regional economy. Construction activities would generate jobs, and it is assumed that the majority of the workforce would be from the local area. In the short term, this employment would contribute to local earnings and induced spending. No permanent or long-lasting socioeconomic effects are anticipated as a result of construction.

According to 2005 to 2009 American Community Survey estimates (U.S. Census Bureau 2011), the average family size in Berkeley County is 3.34 persons and the average size in Census Tract 207.03 is 3.51 persons. Therefore, based on these estimates, it is anticipated that approximately 1,000 dependents would accompany the incoming 290 permanent Navy and civilian personnel assigned to NPTU Charleston.

These additional students, staff, and dependents represent both a short- and long-term increased input into the BCD regional economy since it is anticipated that this uptake in student and staff numbers will be coming from areas other than the ROI. There would be minor, short- and long-term, beneficial socioeconomic effects under any of the action alternatives associated with personnel increases and resultant population growth and increased spending.

3.6.2.3 Housing

In terms of housing, the 1,443 additional students and staff during the peak transition phase and the 572 additional students and staff over the long term represent just 3.4 percent and 1.4 percent, respectively, of the vacant housing units (refer to Table 3.6-1) currently available within the BCD Region. Based on the existing housing inventory and projected increase in housing in the BCD Region (refer to Table 3.6-11), it is reasonable to conclude that current and future housing capacity would be sufficient to absorb the additional NPTU Charleston students, staff, and any dependents during both the peak transition phase and in the long term. This is a reasonable conclusion regardless of whether economic conditions improve significantly or remain at or near current levels, since although housing growth may not occur at the level forecasted in regional planning documents, some housing growth will nonetheless occur, resulting in additional housing options for students, staff, and their dependents locating to the region as part of the NPTU Charleston expansion. Therefore, none of the action alternatives would have negative impacts to the availability or supply of housing in the BCD Region.

No Action Alternative

Under the No Action Alternative, the current NPTU facilities would remain unchanged and the proposed construction activities would not occur. Therefore, no impacts from construction-related spending would occur in the short-term. There would be long-term direct and indirect positive socioeconomic impacts, due to increased numbers of students and staff and associated spending. Local housing stock would be able to meet the anticipated increase in demand for housing units.

3.7 TRANSPORTATION

Transportation resources include the vehicle movement throughout a road and highway network, as well as navigational channels used for moving large vessels and other boat traffic. For the purposes of this EA, transportation includes both ground traffic occurring at JB CHS-W and navigational traffic that would occur in the Cooper River adjacent to NPTU Charleston.

3.7.1 Affected Environment

3.7.1.1 Land-based Transportation and Traffic

JB CHS-W employs 20,172 active duty, reserve, and civilian personnel. As a result, JB CHS-W is a major generator of vehicle traffic, and the roads and highways that serve the station can be congested, particularly during the morning and evening peak traffic periods.

Roadways. Three major arterial roadways are located in the vicinity of JB CHS-W (refer to Figure 1-1):

- **Interstate 26 (I-26)** crosses the ROI in a northwestern-southeastern direction west of the JB CHS-W. University Avenue (Ave), State Route 8-43 (S-8-43), and Red Bank Road (Rd) connect the interstate to the Station's Main Gate at Red Bank Rd.
- **Rivers Ave (also identified as U.S. Highways 78 and 52 [U.S. 78, U.S. 52]**) is an urban principal arterial roadway oriented parallel to I-26 in the vicinity of the station and lies between the JB CHS-W and I-26. Red Bank Rd and S-8-43 connect Rivers Ave to the Main Gate.
- **I-526 (also identified as Mark Clark Expressway)** is located south of the station and serves as a high-speed, limited access beltway around downtown Charleston, connecting with Rivers Ave and I-26.

Five arterial roadways connect the Station to the major arterial roadways and the region through a series of gates located along the periphery of the station (Figure 3.7-1):

- **Red Bank Rd** is an urban principal roadway that provides primary access to the station from I-26, Rivers Ave, and North Rhett Ave through the JB CHS-W Main Gate and functions as the primary east-west connector. This road is a state-maintained highway constructed on JB CHS-W-owned property that is leased to the South Carolina Department of Transportation. West of North Rhett Ave, Red Bank Rd has five lanes, but on Station it decreases in size to only two lanes. This leads to congestion at peak morning and evening commuting hours.
- **North Rhett Ave** is a four-lane, urban minor arterial that is located just to the west of JB CHS-W. It functions as the primary connector for gate traffic between the northern and southern parts of JB CHS-W at the Main and Liberty Hall Gates.
- **Bushy Park Rd** is a two-lane rural principal arterial. This road is a state-maintained and connects with Red Bank Rd. It then goes through the Bushy Park Gate and proceeds to the north, and finally off JB CHS-W.

- **Remount Rd** (or S-10-13) is a four-lane, east-west urban principal arterial roadway located along the southern edge of JB CHS-W which connects two JB CHS-W entrances with the primary arterials.
- **Virginia Ave** (or S-10-58) is a four-lane, north-south urban roadway that connects one of the southern JB CHS-W entrances to Remount Rd and I-526.

Traffic Conditions. Transportation planning for the area encompassed by JB CHS-W and the urbanized parts of the ROI is the responsibility of the Charleston Area Transportation Study (CHATS), which is part of the BCDCOG. For this study, data on traffic conditions were collected and long-range plans prepared that set forth the priority for future transportation improvements. The current CHATS, Long-Range Transportation Plan (BCDCOG 2005b), indicates that regional population increased more than 20 percent from 1980 to 2000. As a result, regional vehicle miles of travel tripled between 1990 and 2000, commuting times increased, and many major area roadways were congested during peak travel periods. This plan also assumed that regional population will increase by another 20 percent or more from 2000 to 2020.

The long-range plan depicts 2003 roadway volume/capacity ratios based on average annual daily traffic levels for the roads and highways in and around JB CHS-W (BCDCOG 2005b). Volume/capacity ratios compare the actual volume of traffic carried by a roadway to the theoretical capacity of the roadway. According to the *Highway Capacity Manual* (Transportation Research Board 2010), a ratio of 0.8 to 0.89 indicates reduced speeds and increased delays or a level of service D, but the traffic volume is less than the roadway's capacity and a roadway is operating acceptably. A ratio of 0.90 to 0.99 or a level of service E indicates slow traffic speeds and significant delays. A volume/capacity ratio of more than 1.0 or a level of service F means more volume than the roadway can handle – there is a high level of delay and traffic may operate in stop-and-go conditions.

According to the CHATS, peak travel periods and peak travel hours were determined by measuring travel speeds from May 29 to June 4, 2008 on five congested corridors (Burns 2011). The morning peak period with the highest levels of traffic congestion occurs from 6 am to 9 am. The morning peak hour – the hour with the highest levels of traffic congestion – occurs from 7 am to 8 am. The evening peak period extends from 4 pm to 7 pm, with the peak hour from 5 pm to 6 pm (Burns 2011).

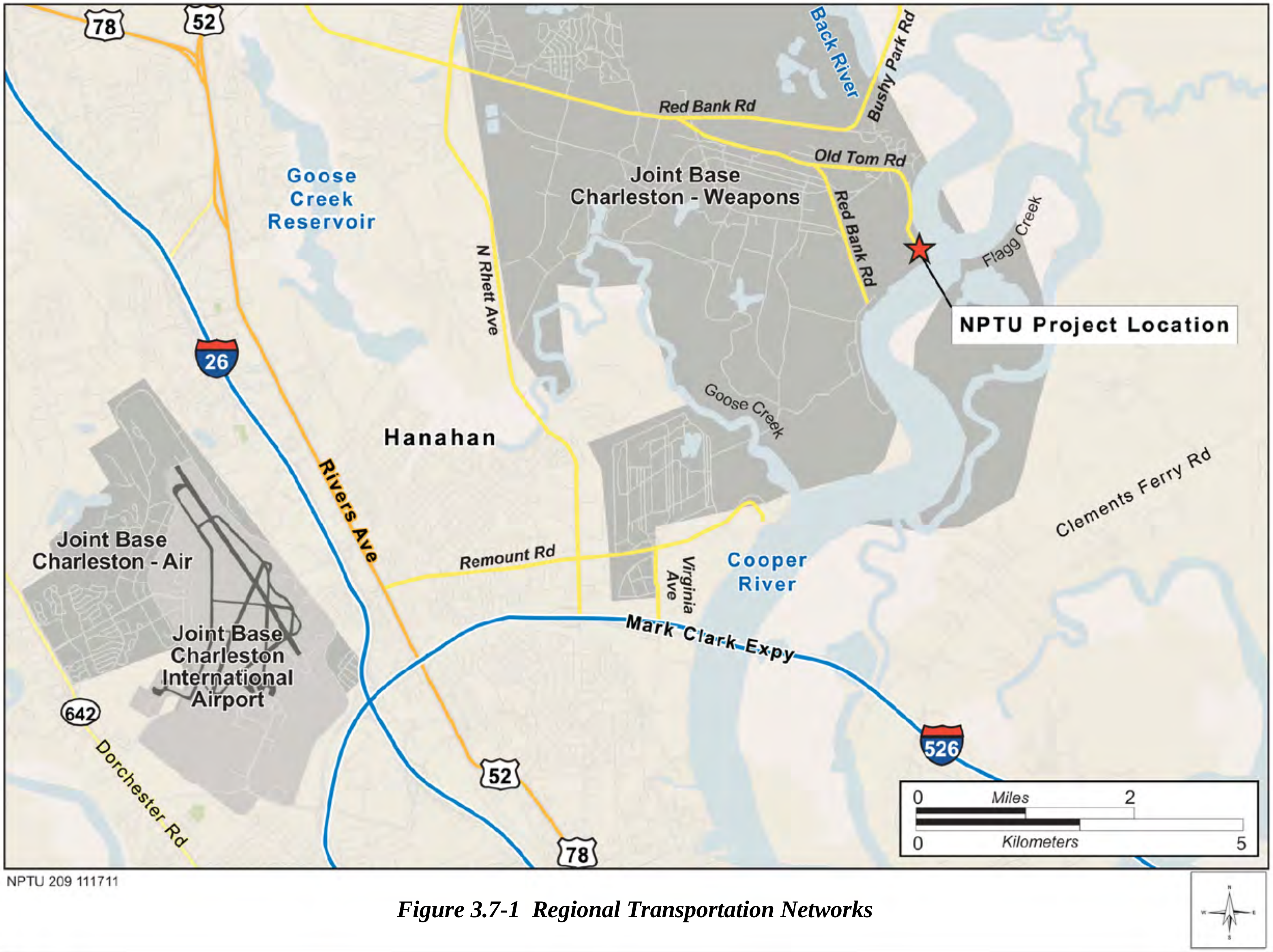

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Figure 3.7-1 Regional Transportation Networks

Roadways depicted in the Plan with volume/capacity ratios in 2003 greater than 1.5—indicating very heavy congestion and delays during peak periods—included most of the roads that serve the entrances to the Station:

- Red Bank Rd from the Main Gate east across the Station.
- On Station at Bushy Park Rd, from Red Bank Road north to its terminus at Rivers Avenue.
- S-8-43 (also known as Goose Creek Rd/Old State Rd/Howe Hall Rd), connecting Red Bank Rd to Rivers Ave and University Boulevard (U.S. 78) (which eventually connects with I-26.
- Remount Rd from Virginia to Rivers Ave.
- North Rhett Ave from Red Bank Rd south almost to Remount Rd (BCDCOG 2005b).

Also in the ROI, Rivers Ave had a volume/capacity ratio of 1.0 from S-8-43 south to I-526. While the traffic volume/capacity data are more than 5 years old, there is no reason to believe that conditions have improved. Traffic volumes have increased and no major transportation improvements have taken place on these roadways. These data indicate that vehicles entering and leaving JB CHS-W gates and crossing the Station encounter a considerable amount of congestion during peak travel periods. The traffic volume inside the gate is controlled by the rate at which security checks are completed for incoming vehicles. Once on-site, traffic volume is not currently problematic. Once the traffic increases, no adverse conditions are expected on base due to the small percentage of change to overall traffic volume.

Annualized average daily traffic volumes for 2010 indicate that 19,200 vehicles enter and leave the Station through the Main Gate on Red Bank Rd on an average day (BCDCOG 2011). Bushy Park Rd had volumes averaging 2,100 vehicles daily in the vicinity of the Bushy Park Gate. Traffic volumes at two points along Remount Rd, near the two southern entrances, were 16,300 and 12,500 vehicles daily. Virginia Ave, at a southern gate, had daily volumes averaging 9,700 vehicles.

Two bus transit systems operate in the ROI: Charleston Area Regional Transportation Authority and Tri-County Link (Berkeley County Planning Commission 2010). While one of Tri-County Link's routes – B102 – passes close to JB CHS-W, it would be difficult for JB CHS-W workers to make use of the service because of the distances from bus stops to on-Station employment centers. The 1999 *Berkeley County Comprehensive Plan* indicated that less than 0.5 percent of the population relied on public transportation to reach places of employment (Berkeley County Planning Commission 1999).

As noted in Section 1.2.4, NPTU Charleston students and staff live off Station and typically drive alone to work. Student training is conducted 24 hours a day, 7 days a week in small classes that are staggered, making it difficult to use carpooling, public transit, or base transportation to commute. NPTU Charleston students and staff currently park in surface parking lots near NPTU's facilities (see Figure 1-2). The current number of parking spaces, 1,040, is inadequate to meet existing demands.

3.7.1.2 Navigational Traffic

Regulatory Overview. Section 10 of the Rivers and Harbors Act of 1899 requires that Department of the Army permits be obtained to authorize certain structures or work in or affecting navigable waters of the U.S. The Cooper River meets the regulatory definition of navigable water. Extending the pier and constructing a concrete utility trench at Pier X-Ray North, extending the PSBs, and dredging represent work in navigable waters of the U.S; therefore, these activities require USACE permit authorization.

Navigational Traffic. Charleston and Goose Creek are served by various navigation channels, providing ready access to the Atlantic Ocean and surrounding ports for all shipping activity. The channels also serve as an ocean-going route to the eastern shoreline of the Atlantic states through the Atlantic Intracoastal Waterway.

NPTU Charleston is located along the west bank of the Cooper River at Snow Point, upstream of the confluence of the river and Goose Creek. Charleston Harbor is located at the confluence of the Ashley, Cooper, and Wando Rivers, and is the approach for ocean vessels transiting to the Cooper River (refer to Figure 1-1).

The Navy maintains a navigation channel on the Cooper River under USACE Charleston District Permit 2009-00175-2IR. The permit authorizes maintenance dredging of approximately 1 million cubic yards of material per year for a period of 10 years, ending on March 31, 2020. The authorized dredging area extends from the mouth of Goose Creek to a point approximately 4.8 miles upstream, past the NPTU Charleston piers. Due to silting of the Cooper River, the channel requires periodic dredging to be maintained at or near navigable depths to support the movement of shipping on the river (NOAA 2010).

In the immediate vicinity of the area proposed for development along the Cooper River, the USACE currently contracts out the dredging of the channel to a project width varying from approximately 800 ft at Pier X-Ray North to approximately 720 ft at the downstream end of Pier X-Ray South. The USACE permit authorizes dredging to a depth of 40 ft, referencing mean lower low water, plus an allowable overdepth of 2 ft.

The size of vessels transiting the Cooper River reach at NPTU Charleston is controlled, in part, by the clearances of the I-526 fixed bridge, which crosses the Cooper River at Filbin Creek in North Charleston. The bridge has a vertical clearance of 155 ft and a horizontal clearance of 700 ft (NOAA 2006, 2010). Another size-limiting factor for ships is an overhead power cable (just upstream of the I-526 bridge and crossing Cooper River at the Filbin Creek Reach), which has a vertical clearance of 182 ft. Several miles upstream of NPTU Charleston, there is another overhead power cable with a vertical clearance of only 75 ft across the river. Other size limiting factors for transiting ship vessels is the depth of the river, as well as a series of tight river bends, upstream of the mouth of Goose Creek.

For security purposes, a restricted area (described in 33 C.F.R. § 334.460) is established adjacent to NPTU Charleston that encompasses the west side of the Cooper River to the PSB. Within this restricted area, unauthorized persons, vessels, or other watercraft are prohibited from entering within 100 yd of the west bank of the river in those portions devoid of any vessels (i.e., MTS) or manmade structures (the support barges). Where vessels or manmade structures are present, the restricted area extends 100 yd from the shoreline or 50 yd beyond the vessels or manmade structures, whichever is the greater.

Also in the vicinity of NPTU Charleston, the U.S. Coast Guard established a fixed security zone on all waters of the Cooper River from the I-526 bridge upstream to the confluence of Foster Creek (33 C.F.R.

§ 165.709). When security assets are present, vessels or persons are prohibited from entering, transiting, mooring, anchoring, or loitering within the zone unless authorized by the Captain of the Port of Charleston.

Ship traffic transits the Cooper River to a tanker wharf on the east bank of the river at the Amoco Chemicals Cooper River Plant, approximately 1.15 statute miles (or 1 nautical mile) upstream of the NPTU Charleston piers (NOAA 2010). Daylight-only ship traffic extends upstream as far as the Nucor Steel Plant, accessing a slip for ocean-going barges on the east bank, approximately 6.9 statute miles (or 6 nautical miles) upstream of NPTU Charleston piers. Ships transiting this section of the Cooper River are limited in size to a maximum length of 580 ft and a maximum draft of 25 ft (NOAA 2010). In addition, the Pilots' Association restricts ship movement to certain tidal and current conditions.

Gulf Engineers & Consultants (2006) compiled data on the number and type of vessel calls, both arrivals and departures, on the Cooper River upstream of Shipyard Creek (about 10.4 statute miles or 9 nautical miles downriver of NPTU Charleston). The data were from pilotage records provided by the Charleston Branch Pilots' Association for 3 years, from 2002 through 2004. Gulf Engineers & Consultants used the data to provide a baseline of the pattern of commercial marine activity and prepare a vessel fleet forecast for the period 2004 through 2025 (Table 3.7-1).

Table 3.7-1 Upper Cooper River Forecasted Vessel Trips by Vessel Type

Vessel Type	2010	2015	2020	2025
Breakbulk	74	78	82	86
Bulk	159	167	176	185
Container	1,087	1,732	2,232	2,432
Roll-on/Roll-off	74	78	82	86
Tank	244	257	270	283
Tugboat/Barge	100	105	110	116
Other	27	28	29	31
TOTAL	**1,765**	**2,445**	**2,981**	**3,219**

Source: Gulf Engineers & Consultants 2006.
Note: Vessel trips are counted as one-way passages that require pilotage.

While these data do not represent the exact number of all vessel types that transit the Cooper River adjacent to NPTU Charleston, they do indicate an upper limit for tanker and tugboat/barge commercial traffic to and from the Amoco Chemicals and Nucor Steel plants upriver of NPTU Charleston. Extrapolating from these data, there were a maximum of five tankers and two tug/barges per week over a 3-year period of 2002 through 2004.

3.7.2 Environmental Consequences

Adverse impacts to land-based transportation would occur if any of the proposed action alternatives created a situation that disrupted established traffic patterns at JB CHS-W, noticeably degraded ground traffic flow, altered any aspects of public transportation availability, or caused measurable delays at entrance gates to the Installation. Adverse impacts navigational traffic would be occur if any of the proposed action alternatives created a situation that disrupted established marine vessel passage past the NPTU piers, caused encroachment into the federal navigation channel, created a new hazard to navigation, or make a portion of the Cooper River impassible to any marine traffic that currently uses the area near the NPTU.

3.7.2.1 Land-based Transportation and Traffic

Action Alternatives

As described in Section 1.2.1 and shown in Table 1-1, the maximum number of assigned personnel (staff and students) currently on site in a 24-hour period is 1,392. This would increase during the peak transition period to 2,437, an increase of 1,045 personnel (or 75 percent) above baseline levels. From FY22 onwards, it is anticipated that the maximum number of personnel on site, over a 24-hour period, would be 1,803, an increase of 411 personnel (or 30 percent) above baseline levels.

As presented in Section 1.2.1, personnel work staggered shifts 24 hours a day, 7 days a week. Training department personnel work 8-hour shifts, and students work 12-hour shifts. Shifts for the two training ships are currently staggered by 1 hour. The six staff shifts are 8 am to 4 pm, 4 pm to 12 pm, and 12 pm to 8 am for MTS 626; and 7 am to 3 pm, 3 pm to 11 pm, and 11 pm to 7 am for MTS 635. The six student shifts are 8 am to 8 pm, 12 pm to 12 am, and 8 pm to 8 am for MTS 626; and 7 am to 7 pm, 11 am to 11 pm, and 7 pm to 7 am for MTS 635. Some weeks the training schedule shifts to 6:30 am to 4:30 pm for staff and 6:30 am to 6:30 pm for students. It is assumed that most staff and students live off station and commute to work in single-occupant vehicles; it is also assumed that work shifts under all action alternatives would be staggered in similar fashion.

During the FY20-22 peak transition period, an additional 551 students and 504 Navy and civilian staff would be on site in a 24-hour period. This would mean there would be nine 8-hour staff shifts and nine 12-hour student shifts. Because a third MTS would be operating, work and training shift schedules would spread out more throughout 24 hours to accommodate the additional staff and students. The shift for a third MTS might begin at 6 am, for example – so that personnel would arrive before the 6 am to 9 am peak travel period commences. Assuming a 7 am start time for the second MTS shift, there would be an increase of 117 single-occupant vehicle trips into the Station from 6 am to 7 am – the first hour of the morning peak period – and 117 single-occupant vehicle trips during the 7 am to 8 am morning peak travel hour for those arriving for the shift beginning at 8 am. If the third, new MTS shift were to begin at 9 am rather than 6 am, an additional 117 vehicle trips would enter the Station between 8 am to 9 am. However, because station traffic enters from a number of directions/ roadways/gates, and the number of personnel and visitors entering JB CHS-W is over 15,000 daily (based on 2010 traffic counts [BCDCOG 2011]), any impacts on traffic congestion at any one entrance would be spread across the Station. When compared to baseline conditions, this approximate 1 percent increase in vehicle numbers should not represent an adverse impact. Currently, existing traffic networks (e.g., Red Bank Rd, S-8-43, and Remount Rd) suffer level of service F or heavy congestion and wait times during peak travel periods.

Beginning in FY22, the peak in personnel would abate. The total number of NPTU Charleston personnel would decline, as would vehicle trips from peak levels. In the long-term, there would be an increase above current baseline levels of 1,392 to 1,803 students and staff on site in any given 24-hour period.

MTS 626 would be retired, resulting in a return to six 8-hour staff shifts per 24-hour day and six 12-hour student training shifts per 24-hour day on MTS 701 and MTS 711.

Relative to current personnel loadings, approximately 70 additional single-occupant vehicles (1/6 x [36 staff + 35 students] = 70 people) would enter the Station from 6 am to 7 am and another 70 vehicles would enter during the 7 am to 8 am morning peak travel hour. Because there are several Station entrances, and the number of vehicles entering the Station daily is more than 15,000, any impacts on traffic congestion at any one entrance would be imperceptible. Similarly, a staff shift ending at the beginning of the evening peak travel period at 4 pm, and adding 36 staff vehicle trips to the traffic departing the Station, would not be adverse. In summary, if any of the action alternatives were implemented, the existing traffic networks would continue to have a level of service F.

No Action Alternative

Under the No Action Alternative, NPTU Charleston would not expand and upgrade their infrastructure to accommodate increased student loading, but increased student loading would still occur. Therefore, impacts to traffic conditions in and around the base would the same as those described under the action alternatives. There could be adverse impacts for parking at NPTU Charleston if additional space is not made available.

3.7.2.2 Navigational Traffic

Alternatives 1, 2, and 5

Under Alternatives 1, 2, and 5, the existing finger pier at X-Ray North would be demolished and the pier permanently extended by about 300 ft. There would be about 27,000 cy dredged to a depth not to exceed 42 ft, within the already permitted dredge maintenance area (Figure 3.7-2). The dredged material would be disposed in the nearest approved dredge material handling facility with adequate capacity, most likely the Yellow House Creek facility.

As was noted above, USACE Permit 2009-00175-2IR, authorizes JB CHS-W to dredge approximately 1 million cy of material per year in the Cooper River, through March 2020, from a location in and near the mouth of Goose Creek to a point approximately 4.8 statute miles (or 4.25 nautical miles) upstream, to maintain depths for safe navigation. Additional dredging quantities, if any, under Alternatives 1, 2, and 5 would not exceed permitted levels.

Delivery of equipment and materials to the site, dredging, and in-water construction operations may slow marine passage within the Cooper River. However, the interruptions to marine passage would be temporary and of short duration and would not substantially affect traffic on the waterway, including the estimated maximum of five tanker and two tug/barge transits per week. During proposed in-water construction, the Navy would work with Amoco Chemicals and Nucor Steel to schedule passage of commercial vessels so as to minimize potential conflicts and delays.

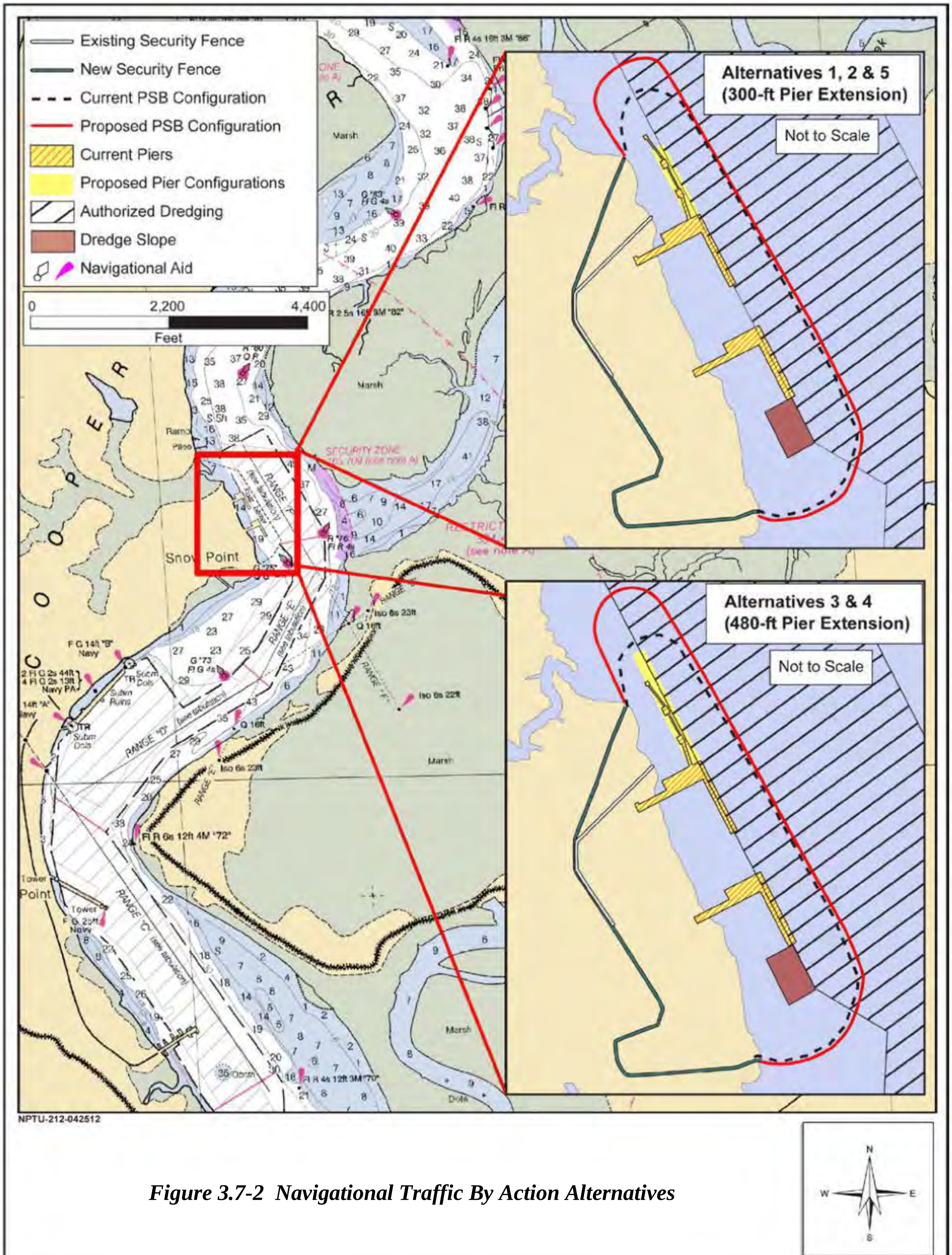

Figure 3.7-2 Navigational Traffic By Action Alternatives

The proposed extension of Pier X-Ray North to the north and the northward expansion of the PSB would be parallel to the shore and along the axis of the navigation channel. Neither structure would be expanded eastward into the navigation channel; therefore, their construction would not create navigational conflicts with marine traffic in the channel compared to baseline conditions (see Figure 3.7-2).

As discussed above, the security restricted area would continue to encompass the west side of the Cooper River in the vicinity of NPTU Charleston. Under Alternatives 1, 2, and 5, the PSB change would not reduce the width of the navigational channel. The position of the extended pier, associated PSB, or MTSs would parallel to the shoreline and would not encroach on the width of the navigation channel. Existing procedures to notify mariners would be undertaken to minimize conflict during construction and dredging activities. Navigational traffic, therefore, would experience minor impacts when compared to baseline conditions.

Alternatives 3 and 4

With respect to navigational traffic, Alternatives 3 and 4 differ from Alternatives 1, 2, and 5 because of the increased length proposed for Pier X-Ray North and PSB requirements. While there would be 180 ft more space needed to the north of Pier X-Ray North (when compared to Alternatives 1, 2, and 5) this added room would not require dredging outside the currently permitted area nor extend outside current restricted area boundaries. Because the northward expansion of the PSB would be parallel to the shore and along the axis of the navigation channel, it would not narrow the navigational channel. Therefore, the likelihood of conflicts with marine traffic in the channel would not change when compared to baseline conditions. Additional dredging quantities, if any, under Alternatives 3 and 4 would not exceed permitted levels. Existing procedures to notify mariners would be undertaken to minimize conflict during construction and dredging activities. Navigational traffic, therefore, would not experience any major impacts when compared to baseline conditions.

No Action Alternative

Under the No Action Alternative, there would be a temporary impact to navigational traffic from maintenance dredging activities. Baseline waterway transportation conditions in the Cooper River would continue and no impacts to navigational traffic would occur from implementation of the No Action Alternative.

3.8 PUBLIC HEALTH AND SAFETY

Occupational health and safety applies to on-the-job safety and implements the requirements of 29 C.F.R. § 1926 *et seq*. All construction and demolition at JB CHS-W is performed in accordance with applicable Occupational Safety and Health Administration (OSHA) regulations. Specific practices and policies to protect human health and minimize safety risks are coordinated between contractors and NPTU Charleston prior to initiation of construction and demolition activities. Please refer to Section 3.11 for MTS operational aspects of this proposal.

3.8.1 Affected Environment

NPTU Charleston is located completely within the explosive safety quantity distance (ESQD) arc of Wharf Alpha (a munitions storage area and pier located approximately 0.5 miles south of NPTU). As such, all buildings are required to conform to the design and construction requirements to protect personnel within inhabited structures per DoD Manual 6055.09-STD *DoD Ammunition and Explosives Safety Standards* and UFC 3-340-02 *Structures to Resist the Effects of Accidental Explosions*. DoD Manual 6055.09-STD establishes safety standards designed to manage risks associated with ammunition and explosives by providing protection criteria to minimize serious injury, loss of life, and damage to property. This manual also requires submitting site and general construction plans for non-ammunition and explosive facilities located within ESQD arcs to the DoD Explosives Safety Board for review and approval. UFC 3-340-02 contains design procedures to achieve personnel protection, protect facilities and equipment, and prevent propagation of accidental explosions.

3.8.2 Environmental Consequences

Health and safety potentially affected by the action alternatives include those associated with construction and facility improvements. Impacts would be considered adverse if an action would create a situation involving endangerment or unusual risk to military personnel, visitors to a military installation, or those on lands adjacent to a military installation. These include conditions that would potentially result in the exposure of persons to dangerous conditions. Once facilities are operational, impacts associated with NPTU Charleston training would pertain to NPTU students and staff. Potential impacts due to nuclear operations both on and off Station are addressed in Section 3.11.

Alternatives 1 through 4

Under Alternatives 1 through 4, construction and demolition activities would occur at NPTU Charleston. These activities may expose workers to construction-related risks. However, the proposed construction and demolition activities would not introduce any unique or unusual risks. Specific practices and policies to protect human health and minimize safety risks would be coordinated between the contractor and the Safety Office prior to initiation of construction and demolition activities. Furthermore, activities would follow all applicable OSHA requirements. No adverse impacts to public health and safety are anticipated from construction and demolition activities.

Proposed development under the four action alternatives would occur within the ESQD arc of Wharf Alpha. Per DoD Manual 6055.09-STD and UFC 3-340-02, structures must be designed and constructed to protect personnel and facility functions. By following all DoD regulations and policies, NPTU students and staff would not be exposed to adverse health or safety risks.

Alternative 5

Impacts under Alternative 5 would be the same as Alternatives 1 through 4; however, demolition of Building 43 would not occur. No impacts to public health and safety are anticipated.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

3.9 HAZARDOUS MATERIALS AND WASTE

Hazardous materials are substances that pose a substantial hazard to human health or the environment. Hazardous materials include hazardous substances, extremely hazardous substances, hazardous chemicals, and toxic chemicals. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infectious characteristics. Please refer to Section 3.11 for MTS operational aspects of this proposal.

Resource Conservation and Recovery Act (RCRA) (42 U.S.C. § 6903[5]) defines a hazardous waste as a solid waste, or combination of solid waste, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may: 1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hazardous Materials and Waste

Hazardous substances are defined and regulated under laws administered by OSHA, USEPA, and U.S. Department of Transportation (DOT). Each of these agencies incorporates hazardous substance terminology in accordance with its unique Congressional mandate: OSHA regulations categorize substances in terms of their impacts on employee and workplace health and safety, USEPA regulations categorize substances in terms of protection of the environment and public health, and DOT regulations categorize substances in terms of their safety in transportation.

With regard to environmental impacts, hazardous substances are regulated under several Federal programs administered by the USEPA, including the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Emergency Planning and Community Right-to-Know Act (EPCRA), Toxic Substances Control Act (TSCA), and RCRA. DoD installations are required to comply with these laws along with other applicable Federal, State, and DoD regulations, as well as with relevant EOs.

In regulations promulgated under RCRA, the USEPA defines hazardous waste as a solid waste which is not excluded from regulation as a hazardous waste under 40 C.F.R. § 261.4(b) and exhibits any of the characteristics (ignitability, corrosivity, reactivity, and toxicity) described in 40 C.F.R. § 261; is listed in 40 C.F.R. § 261 Subpart D; or is a mixture containing one or more listed hazardous wastes. Hazardous wastes may take the form of solid, liquid, contained gaseous, semi-solid wastes (e.g., sludges), or any combination of wastes that pose a substantial present or potential hazard to human health or the environment and have been discarded or abandoned. For the purposes of this EA, hazardous wastes include solid wastes that are regulated as hazardous based on either direct listing by USEPA or characteristics (ignitability, reactivity, corrosivity, and toxicity), as well as those contaminants present in environmental media (e.g., soils).

Toxic Substances

The promulgation of the TSCA of 1976 (40 C.F.R. § 700-766) represented an effort by the Federal government to address those chemical substances and mixtures for which it was recognized that the manufacture, processing, distribution, use, or disposal may present unreasonable risk of personal injury or health of the environment, and to effectively regulate these substances and mixtures in interstate commerce. The TSCA Chemical Substances Inventory lists information on more than 62,000 chemicals and substances. Toxic chemical substances regulated by USEPA under TSCA include asbestos and lead, which for the purposes of this EA, are evaluated in the most common forms found in buildings, namely asbestos-containing materials (ACM) and lead-based paint (LBP). TSCA, regulated by USEPA, also establishes management obligations for polychlorinated biphenyls (PCBs).

ACM contains more than 1 percent asbestos and is categorized as either friable or non-friable. ACMs have been classified as a hazardous air pollutant by the USEPA in accordance with Section 112 of the CAA. Surveys would be conducted for ACMs, as required by 40 C.F.R. § 61.145, during the design phase of the project and prior to demolition or renovation of any structure. Any asbestos waste generated would be disposed of at an off Station, permitted landfill. An asbestos facility register is maintained by an Asbestos Operations Officer, who is appointed by the Base Civil Engineer.

LBP is defined as having lead levels equal to or exceeding 0.5 percent by weight. LBP may also be present in buildings or other facilities that would be modified or demolished as part of the proposed action. The Toxicity Characteristic Leaching Procedure would be used to identify whether the lead waste would be handled as a hazardous waste due to its toxicity. Based on this laboratory procedure, LBP waste would be considered a hazardous waste if lead is detected at concentrations greater than 5 grams per kilogram. The Base Civil Engineer also has responsibility for the LBP program and appoints the LBP Program and Operations Officers. Although a survey of JB CHS-W was completed in 1997, all older buildings are screened for LBP on an as-needed basis, prior to renovation or demolition activities.

Beginning in the 1920s, PCBs had many common uses, including uses in electrical transformers, as coolants in refrigeration machinery, and in oil and hydraulic fluids. PCBs are toxic and have been classified as a persistent organic pollutant, acting as carcinogens that do not break down easily in the environment. Thus, the manufacture and use of PCBs in the U.S. was banned by Congress in 1979 and cleanup actions are regulated through TSCA. Materials may be screened for PCB contamination prior to disposal.

Contaminated Sites

Potential hazardous waste contamination areas are being investigated as part of the Defense Environmental Restoration Program (DERP). The DoD developed the DERP to identify, investigate, and remediate potentially hazardous material disposal sites on DoD property. As part of DERP, the DoN has created the Installation Restoration Program (IRP). The IRP was designed to identify and clean up past contamination from hazardous substances, pollutants, and contaminants in order to protect human health and safety, and the environment at both Navy and Marine Corps installations. The IRP combines aggressive policies, technical training, innovative technologies, partnering with stakeholders, and proactive, dedicated personnel to clean up past contamination on property under the Navy and Marine Corps stewardship (DoN 2006).

3.9.1 Affected Environment

The affected environment for this resource would be the NPTU Charleston and the activities that take place that may generate any hazardous or toxic waste. The threshold for significance for hazardous and toxic materials and substances would be met if the Proposed Action alternatives caused a substantial increase in the human health risk or environmental exposure through storage, use, transportation, or disposal of these substances. Again, potential impacts from radiological aspects are covered in Section 3.11.

3.9.1.1 Hazardous Materials and Waste

NPTU Charleston maintains stringent controls on the use of hazardous materials. No hazardous materials or wastes are disposed of at NPTU Charleston other than small quantities of corrosive wastes. Consistent with regulatory requirements, corrosive wastes are neutralized and discharged to the sanitary sewer. In 2010, 6,310 pounds of hazardous waste were generated from routine operations. Examples include laboratory analysis waste and routine maintenance waste such as solvent-contaminated rags, waste paint, and paint thinner. These wastes are controlled in accordance with federal, state, and Navy requirements. NPTU Charleston transfers these waste to JB CHS-W, which holds a RCRA storage permit for short-term waste storage, prior to ultimate off-site treatment and disposal.

3.9.1.2 Toxic Substances

Floor tiles in Bldg 43 have the potential to contain ACM; no other facilities would be demolished that have the potential for ACM, lead, or PCBs.

3.9.1.3 Contaminated Sites

NPTU Charleston has the following three Solid Waste Management Units (SWMUs) within the area of proposed development and one Area of Concern (AOC) as shown on Figure 3.9-1:

- SMWU 60E (South Side Industrial Sanitary Sewer Lines) and SMWU 64 (South Side Building 43 Depth Charge Facility) are classified as requiring no further action;
- SWMU 49 (Weapons Station/Berkeley Publicly Owned Treatment Works Outfall) is outside the area of disturbance.
- AOC-G, surrounding the existing lift station and parking area, is still under investigation. Preliminary results indicate that there are low levels of chemical contaminants present in the soil. Wells are planned around the lift station and parking area to track any possible plumes or future migration.

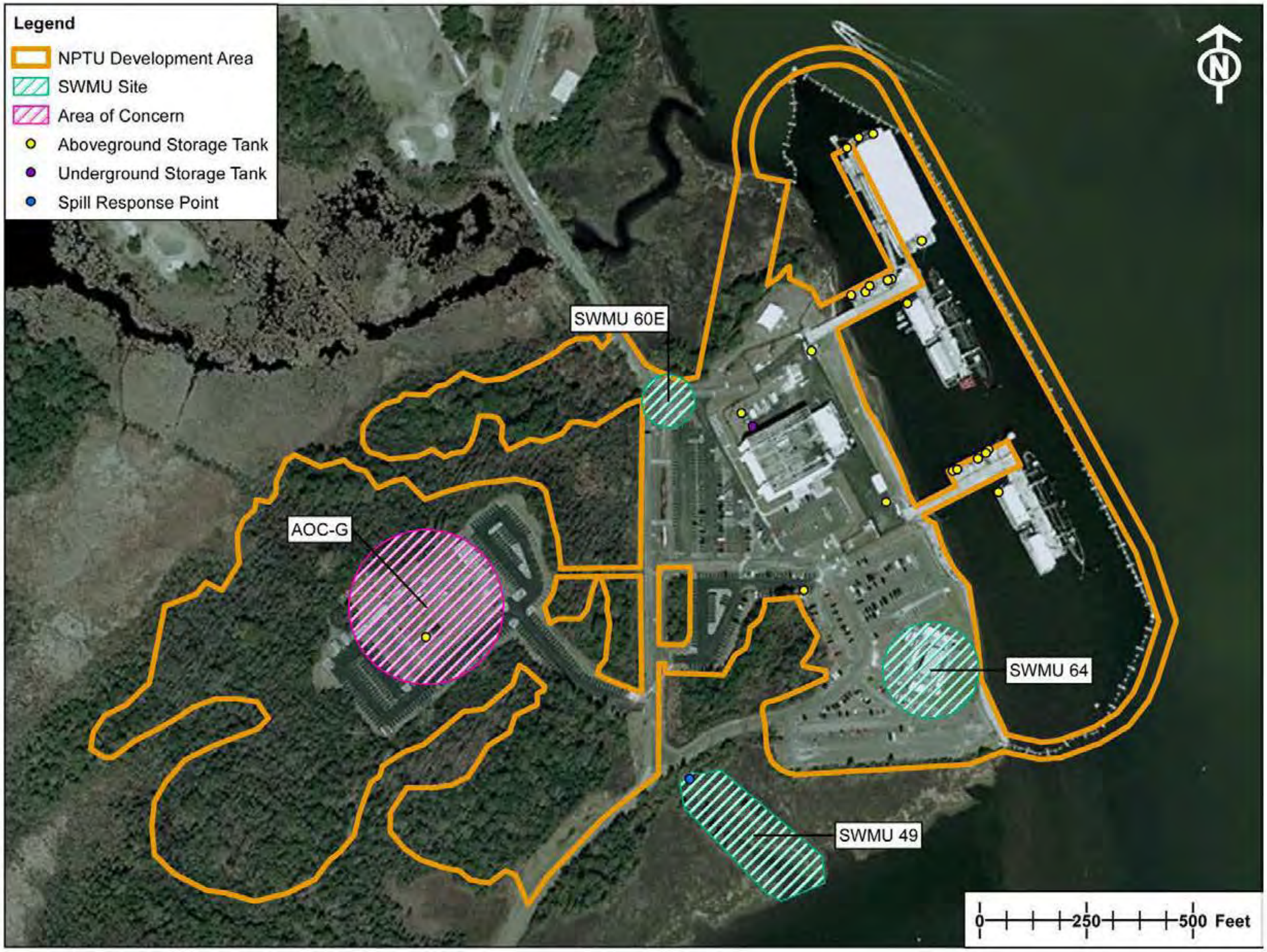

Figure 3.9-1 Solid Waste Management Units in the Vicinity of the NPTU Campus

A number of above ground storage tanks (AST) exist along the water front and on the piers. These tanks store diesel fuel for operation of back-up generators and fire pumps during emergencies. The ASTs comply with all pertinent regulations regarding any spill containment and flammability issues. One underground storage tank (UST) is also found along the northwest side of the TSB. This UST would not be impacted by development.

Also located just outside the area of proposed development is a Spill Response Point. This is a stormwater outfall for NPTU Charleston and would be targeted for action in the event of a contamination spill was to occur at the facility.

3.9.2 Environmental Consequences

The significance of potential impacts associated with hazardous materials and wastes is based on the toxicity, transportation, storage, and disposal of these substances. Hazardous materials and waste impacts would be considered adverse if the storage, use, transportation, or disposal of these substances substantially increases the human health risk or environmental exposure. An increase in quantity or toxicity of hazardous materials and/or hazardous wastes handled by a facility may also signify a potentially adverse impact, particularly if the facility was not equipped to handle a new waste stream.

Action Alternatives

3.9.2.1 Hazardous Materials and Waste

Under the action alternatives, there would be potential for temporary increases in hazardous waste generated from routine maintenance activities. NPTU Charleston only disposes of small quantities of corrosive waste which are neutralized and treated prior to discharge to the sanitary sewer. Moderate quantities of hazardous wastes are generated during normal operations. Examples include laboratory analysis wastes and routine maintenance wastes (i.e., solvent-contaminated rags, waste paint, and paint thinners). These wastes are controlled and managed on-site in accordance with RCRA and applicable SC and Navy regulations. NPTU Charleston transfers these hazardous wastes to JB CHS-W, which holds a RCRA storage permit for short-term storage, prior to ultimate off-site treatment and disposal (NWS Charleston 2010). In 2010, 6,310 lbs of hazardous wastes were transferred to JB CHS-W for storage and ultimate disposal. It is not anticipated that hazardous waste generation associated with operating the newer MTSs would differ from current levels. However, during the transition period when there would be three MTSs in operation, it is anticipated that hazardous waste generation would temporarily increase by about 50 percent. This level would not change the ability of JB CHS-W to store and dispose these wastes.

3.9.2.2 Toxic Substances

With the exception of Alternative 5, Bldg 43 would be demolished. Prior to any demolition activities this building would be surveyed for both LBP and ACM according to established JB CHS-W procedures found in 29 C.F.R. § 1910 and OPNAVINST 5100.19. All ACM would be properly removed and disposed of prior to or during demolition in accordance with 40 C.F.R. § 61.40 through 157 and established JB CHS-W procedures. All LBP would also be managed and disposed of in accordance with the TSCA, OSHA regulations, and established JB CHS-W procedures. As such there would be no long-term impacts to hazardous and toxic materials handling or generation as a result of Alternatives 1 through 4. Bldg 43 would not be demolished under Alternative 5; therefore, no impacts to ACM or LBP are anticipated.

3.9.2.3 Contaminated Sites

Prior to any parking area development in the vicinity of AOC-G, a site survey would be completed to ensure the soils in the area are not contaminated or that any ground disturbance for parking lot construction would not cause an inadvertent release of any hazardous or toxic material. If any hazardous or toxic materials are found, a plan for remediation would be developed and all applicable regulations and safeguards undertaken to ensure protection of the surrounding environment and personnel.

Any soils excavated in areas with potential contamination would be properly segregated by the construction contractor and then sampled by JB CHS-W representatives. The sample results would determine whether soils could be reused or would require disposal off-site at a facility permitted to receive the soils pursuant to appropriate South Carolina regulations. Furthermore, project specific stormwater BMPs such as windbreaks and water spraying would be employed to control dust during excavation and construction activities. It is anticipated that there would be minor impacts to contaminated sites; however, negative effects would be avoided by implementing all applicable federal, state, and local policies, regulations, and rules associated with handling, management, and disposal of contaminated materials.

No Action Alternative

Under the No Action Alternative no construction or demolition activities would occur. The older class of MTS would be replaced with newer MTSs, but this would not alter any impacts to hazardous or toxic material generation or handling at JB CHS-W. The No Action Alternative therefore would have no impacts to this resource and baseline conditions would persist.

3.10 INFRASTRUCTURE AND UTILITIES

Infrastructure refers to the system of public works and utilities that provide the underlying framework for a community or installation. Infrastructure components and utilities to be discussed in this section include public services; energy, communication, and potable water supply systems; and solid waste. Roads and bridge wear and tear could occur on base during construction activities; however, the Navy would monitor these networks and ensure that they are maintained and usable both during and after construction.

3.10.1 Affected Environment

The affected environment for infrastructure and utilities is the JB CHS-W area, which includes portions of Berkeley, Charleston, and Dorchester Counties and their associated municipalities where personnel associated with the Proposed Action would live and work.

3.10.1.1 Public Services

Public services include health services, security services, fire protection, and education services. Housing for JB CHS-W is discussed separately in Section 3.6. This section describes the range of community facilities within the vicinity of JB CHS-W potentially affected by implementation of the five action alternatives.

Emergency Services and Law Enforcement. Ambulance services at JB CHS-W are provided by the Berkeley County Emergency Management Service. Emergency services outside of JB CHS-W boundaries are provided by area municipalities. JB CHS-W has four fire stations (Facility Numbers 90, 308, 783, and 3305) and has mutual aid agreements with the North Charleston, Hanahan, and Goose Creek City Fire Departments (USAF and USN 2009).

On-base law enforcement services are provided by the Air Force (USAF and USN 2009). Police protection in Berkeley, Charleston, and Dorchester Counties is provided by area municipalities, in addition to the respective county Sheriff's Office.

Hospitals. The Joint Ambulatory Care Clinic, located on JB CHS-W, is an 188,000-sf state-of-the-art facility offering comprehensive health care for active duty military, their families, retirees, and veterans (DoD 2011). In addition, there are numerous hospitals in the ROI. They include the East Cooper Medical Center, the Medical University of South Carolina, Roper Hospital, Bon Secours St. Francis Hospital, Trident Medical Center, and Summerville Medical Center (Charleston Metro Chamber of Commerce 2011a).

Schools. No DoD schools are found on base at JB CHS-W, but there are four public school districts serving the region. These include the Charleston County School District (CCSD), Berkeley County School District, Dorchester District 2, and Dorchester District 4. The CCSD is the second largest school system in South Carolina and serves approximately 44,000 students in 80 schools and several specialized programs (CCSD 2011). The Berkeley County School District serves approximately 28,000 students in 40 schools (Berkeley County School District 2011). Dorchester District 2 serves approximately 22,000 students in 21 schools (Dorchester School District 2 2011). Dorchester District 4 serves approximately 2,500 students in five schools (Dorchester School District 4 2011). In addition, there are approximately 65 private and parochial schools in the Charleston area with an enrollment of 11,200 students (Charleston Metro Chamber of Commerce 2011b).

3.10.1.2 Utilities

Energy. JB CHS-W purchases electrical power from the South Carolina Electric and Gas Company (SCE&G); this power is supplied by a 115 kilovolt (KV) power line that enters the Station at the western end of Red Bank Rd. The main substation is located on the north side of Red Bank Rd near Marrington Plantation. The electrical distribution system consists of overhead power lines with an on-station primary line of 13.8 KV. SCE&G also provides electricity for much of the ROI. However, Berkeley Electric Co-op, Santee Cooper, and Edisto Electric Cooperative supply electricity in those areas not covered by

SCE&G (Charleston Metro Chamber of Commerce 2011b). NPTU power is provided by 115 KV lines to a substation near Wharf A. Current rated capacity is 20.3 megavolt ampere (MVA) (or 20.3 megawatts).

Communication. AT&T is the major telecommunication service provider to the Charleston Metro Region, including JB CHS-W (Charleston Metro Chamber of Commerce 2011b).

Potable Water. Potable water at the Station is supplied by the Charleston Water System via a 16-in water main at an approximate pressure of 100 pounds per square inch at the west end of Red Bank Rd and via an 8-in line along Remount Rd. Charleston Water System has a permitted capacity of 118 million gallons/day (mgd); the average daily flow is currently 55 mgd (Charleston Water System 2011). Potable water providers in the ROI include the Berkeley County Water and Sanitation Authority (BCW&SA), Charleston Water Systems, Dorchester County Water and Sewer, Moncks Corner Public Works Commission, Mt. Pleasant Waterworks and Sewer Commission, and Summerville Commissioners of Public Works (Charleston Metro Chamber of Commerce 2011c).

Wastewater. The treatment and disposal of sanitary sewage generated at JB CHS-W is handled by BCW&SA at their Lower Berkeley Wastewater Treatment Facility. BCW&SA has an overall permitted capacity of 19 mgd (BCW&SA 2011). Wastewater service providers in the ROI include BCW&SA, Dorchester County Water and Sewer, Moncks Corner Public Works Commission, Mt. Pleasant Waterworks and Sewer Commission, North Charleston Sewer District, and Summerville Commissioners of Public Works (Charleston Metro Chamber of Commerce 2011c).

Solid Waste. In general, there are three classifications for landfills in South Carolina. Class 1 landfills accept land-clearing debris, Class 2 landfills accept construction and demolition (C&D) debris, and Class 3 landfills accept household garbage or municipal solid waste. JB CHS-W does not support any type of landfills within its boundaries.

There are four Class 2 (C&D) landfills in the ROI: the Berkeley County Landfill in Berkeley County, Charleston County Bees Ferry Landfill in Charleston County, Spring Grove Environmental Landfill in Charleston County, and Carolina Landfill in Dorchester County. The Berkeley County Landfill has an annual permitted rate of disposal of 214,703 tons and disposed of 23,450 tons in FY10 (SCDHEC 2010). The landfill has an estimated facility life of 3 years (SCDHEC 2010). The Charleston County Bees Ferry Landfill has an annual permitted rate of disposal of 200,000 tons and disposed of 41,255 tons in FY10 (SCDHEC 2010). The landfill has an estimated facility life of 1.3 years (SCDHEC 2010). The Spring Grove Environmental Landfill has an annual permitted rate of disposal of 500,000 tons and disposed of 126,437 tons in FY10 (SCDHEC 2010). The landfill has an estimated facility life of 147.3 years (SCDHEC 2010). The Carolina Landfill has an annual permitted rate of disposal of 120,120 tons and disposed of 76,185 tons in FY10 (SCDHEC 2010). The landfill has an estimated facility life of 51.4 years (SCDHEC 2010).

There are four municipal solid waste landfills located in the ROI - the Berkeley County Landfill, Charleston County Bees Ferry Landfill, Oakridge Landfill in Dorchester County, and the Pepperhill Landfill in Dorchester County. The Berkeley County Landfill has an annual permitted rate of disposal of

1,000,000 tons and disposed of 187,589 tons in FY10 (SCDHEC 2010). The landfill has an estimated facility life of 24.8 years based on current disposal rates (SCDHEC 2010). The Charleston County Bees Ferry Landfill has an annual permitted rate of disposal of 180,000 tons and disposed of 158,095 tons in FY10 (SCDHEC 2010). The landfill has an estimated facility life of 35.9 years based on current disposal rates (SCDHEC 2010). The Oakridge Landfill has an annual permitted rate of disposal of 1,144,000 tons and disposed of 564,378 tons in FY10 (SCDHEC 2010). The landfill has an estimated facility life of 10.9 years based on current disposal rates (SCDHEC 2010). The Pepperhill Landfill has an annual permitted rate of disposal of 214,500 tons and disposed of 109 tons in FY10 (SCDHEC 2010). The landfill has an estimated facility life of 2,306.9 years based on current disposal rates (SCDHEC 2010).

3.10.2 Environmental Consequences

Impacts to infrastructure and utilities would be considered adverse if an action alternative degraded the existing infrastructure such that it would not be able to provide the requisite services, or if capacity issues developed for services and utilities provided by any locality.

3.10.2.1 Public Services

Emergency Services and Law Enforcement. Under Alternatives 1 through 5, there would be an overall 31 percent long-term increase in assigned students and staff, with a surge of 78 percent occurring in FY20 to FY22 (refer to Table 1-1). There are currently 644,506 people in the Charleston metropolitan area (Charleston Metro Chamber of Commerce 2011c). When compared to the metropolitan population, the short-term peak of student and staff represents an increase of about 0.2 percent; in the long term NPTU Charleston student and staff would add about 0.09 percent to the population. Given these minor increases, it is not expected that emergency services and law enforcement would be degraded in their ability to respond to anticipated demand; no adverse impacts are expected.

Hospitals. It is anticipated that students, staff, and dependents would use the new Joint Ambulatory Care Clinic for medical services; there is capacity at the clinic to meet this increase in demand. Within the ROI, there are numerous hospitals and clinics that can easily meet demand so as not degrade their ability to deliver these services; no adverse impacts are expected.

Schools. It was assumed that the majority of school age dependents would be associated with NPTU Charleston Navy and civilian staff and not students. It is anticipated that the temporary surge of about 1,700 staff and the long-term increase of 300 people would increase the number of school-age dependents in the ROI. It is anticipated that this minor increase of school-aged children, in the short- and long-term, would be accommodated in regional schools. There is capacity within these four school districts to meet the increased demand; therefore, no impacts are expected.

3.10.2.2 Utilities

Energy. Executive Order 13514 (*Federal Leadership in Environmental, Energy, and Economic Performance*) requires that existing buildings be managed to reduce energy consumption, that all new federal buildings entering the planning process in 2020 are designed to achieve zero-net-energy standards by 2030, and that 95 percent of all new contracts include products that are energy-efficient.

The proposed utility upgrades would include increasing the number of electrical power supply lines to NPTU Charleston on JB CHS-W to provide an alternate source of electricity. All power lines would use existing utility corridors on JB CHS-W. There would be minor adverse impacts associated with the replacement of some existing utility poles, but these would be mitigated through the use of sediment controls. Utility pole replacement would not occur in wetlands and would be undertaken in accordance with JB CHS requirements to preserve any inadvertent historic discoveries made during digging. There is current capacity to support increases in power; therefore, it is not expected there would be any adverse impacts to the regional suppliers' ability to provide energy.

Communication. The proposed new facilities would require connections to communications lines; requirements would be similar to what currently exists at NPTU Charleston. This conclusion is justified since the end-state would involve the same number of MTSs and would consolidate training and academic functions in modern TSBs; it is not anticipated there would be any negative effects. Local communications providers would not be affected if any action alternative were implemented.

Potable Water. Water would be consumed by students and staff at the NPTU Charleston as well as at home. This analysis assumed that the average daily water consumption is the same as the wastewater flow rates. As such, it is assumed that each NPTU Charleston student and staff member both at work and at home would consume an average of 13.0 and 69.3 gallons per day (gpd), respectively (USEPA 2002). Table 3.10-1 provides projected net change in water consumption by students and staff under any of the action alternatives; refer to Table 1-1 for total assigned numbers used in these calculations. Table 3.10-1 also provides estimates of the residential water consumption that would be consumed by NPTU Charleston students and staff; please note dependents are not included in the projected consumption estimates.

Table 3.10-1 Daily Potable Water Consumption

Category	Baseline	Peak	Long Term
NPTU Charleston			
Total Students and Staff	1,862	3,305	2,434
Consumption estimate (gpd)	24,206	42,965	31,642
Net Change (gpd)	-	+18,759	+7,436
Residential			
Consumption estimate (gpd)	129,037	229,037	168,676
Net Change (gpd)	-	+100,000	+39,639

Water consumption estimates are considered conservative since they do not take into account implementation of requirements detailed in EO 13514. Specifically, water management strategies, including the use of water-efficient and low-flow fixtures, must be implemented, which would minimize the amount of potable water consumed. EO 13514 also requires that all new construction comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (Guiding Principles). This includes reducing potable water consumption by a minimum of 50 percent over water consumed by conventional means. Leadership in Energy and Environmental Design (LEED) provides a process to achieve the high performance sustainable building objectives found in EO 13514. All new facilities would meet LEED standards to reduce water consumption.

When compared to baseline, there would be a 77 percent increase in operational (i.e., at NPTU Charleston facilities) and residential water consumption during the peak of transition; once the transition is completed, there would be a long-term increase of 31 percent in both operational and residential water consumption. Potable water at NPTU Charleston is supplied by the Charleston Water System. Depending on where students and staff live, potable water providers in the ROI include the BCW&SA, Charleston Water Systems, Dorchester County Water and Sewer, Moncks Corner Public Works Commission, Mt. Pleasant Waterworks and Sewer Commission, and Summerville Commissioners of Public Works (Charleston Metro Chamber of Commerce 2011c). Capacity at any of these providers would not be threatened, nor the system degraded either during the peak of transition or in the long term. The additional demand could be accommodated by the existing potable water systems; no adverse impacts are expected under any of the action alternatives.

Wastewater. It was assumed that the average daily wastewater flow, both at NPTU Charleston and residentially, would equal that of water consumption (refer to Table 3.10-1 for estimated potable water flow). As such, it was conservatively assumed that each student and staff member would produce wastewater flows of 13 and 69.3 gpd at the NPTU and at home, respectively (USEPA 2002).

The treatment and disposal of sanitary sewage generated at NPTU Charleston is handled by BCW&SA at their Lower Berkeley Wastewater Treatment Facility. Depending on where students and staff live, wastewater service providers include BCW&SA, Dorchester County Water and Sewer, Moncks Corner Public Works Commission, Mt. Pleasant Waterworks and Sewer Commission, North Charleston Sewer District, and Summerville Commissioners of Public Works (Charleston Metro Chamber of Commerce 2011c). Since adequate capacity exists, no adverse impacts are expected under any of the five action alternatives.

Solid Waste. Under any action alternative, both new construction and demolition would occur. According to the USEPA, the average demolition debris generation rate for nonresidential structures is 158 pounds (lbs) of debris per sf and the construction debris generation rate for nonresidential structures is 4.34 lbs of debris per sf (USEPA 2005a). Using this USEPA debris estimate, proposed demolition and new construction under the most conservative alternative (i.e., the alternative that would generate the greatest amount of debris) would yield approximately 612 tons of C&D debris (Table 3.10-2). Using a conservative estimate that approximately 25 percent of C&D debris would be recycled (USEPA 2005a), the C&D debris estimate was reduced to 459 tons.

Table 3.10-2 Construction and Demolition Debris Generation for Alternative 1

Action	Estimated Size (sf)	Debris Estimate (pounds)
Construction		
Training Support Building 2	97,000	420,980
Training Support Building 2a	90,000	355,880
Gate House	7,500	32,550
Construction	194,500	844,130
	TOTAL (tons)	**422**
	Total with Estimated 25% Recycling Rate (tons)	**317**
Demolition		
Building 43	2,400	379,200
Demolition	2,400	379,200
	TOTAL (tons)	**190**
	Total with Estimated 25% Recycling Rate (tons)	**142**

Solid waste would also be generated by students and staff. The USEPA estimates that the average person generates 4.34 lbs of solid waste per day (USEPA 2009) and that approximately 1.46 lbs of municipal solid waste is recycled (USEPA 2009). Therefore, it was assumed that each person would generate approximately 2.88 lbs per day during daily work operations. In addition, it was assumed that the total amount of days worked in a year totaled 250 days (5-day work week with 10 federal holidays). Refer to Table 3.10-3 for the projected net change in operationally-related solid waste generated by military personnel under any action alternative.

Table 3.10-3 Operational-Related Solid Waste Generation

Alternative	Baseline	Peak	Long Term
Total Students and Staff	1,862	3,305	2,434
Daily (lbs)	5,363	9,518	7,010
Annually (lbs)	1,340,640	2,379,600	1,752,480
TOTAL (tons)	**552**	**979**	**721**
Net Change (tons)	-	+427	+169

As discussed previously, based on current disposal rates the Berkeley County Landfill, Charleston County Bees Ferry Landfill, Oakridge Landfill, and Pepperhill Landfill have a projected facility life of 24.8, 35.9, 10.9, and 2,306.9 years, respectively. During the peak of transition, there would be a 77 percent increase in solid waste generated by students and staff; in the long-term it is expected there would be a 31 percent increase in municipal solid waste. EO 13514 also requires the diversion of at least 50 percent of non-hazardous solid waste, excluding C&D debris, by the end of FY15. The estimates also include solid waste generated at the workplace and at home, which results in an overly conservative estimate. This projected increase (both during the short and long term) is within the permitted annual disposal rates for the four nearby landfills. Since nearby municipal waste landfills have adequate capacity, no adverse impacts to solid waste are anticipated under any of the action alternatives.

No Action Alternative

Under the No Action Alternative, the increase in staff and student populations would still occur; as such, the long-term increase in operational- and residential-related water consumption, wastewater discharge, and solid waste generation would be the same as with the action alternatives presented above. The only difference would be that no construction or demolition would occur. Given the fact that no impacts would occur under any of the action alternatives, it is not anticipated that there would be impacts under the No Action Alternative.

3.11 RADIOLOGICAL ASPECTS OF NUCLEAR-POWERED MOORED TRAINING SHIPS

This section evaluates the radiological aspects of MTSs and related shore-based support facilities, and provides relevant information on the NNPP, which, pursuant to federal law, regulates radioactivity associated with naval nuclear propulsion work. The policies of the NNPP are applied consistently at all locations where nuclear-powered ships are berthed or maintained.

This section has been developed making full use of the extensive body of unclassified environmental information available on nuclear propulsion matters. This information includes detailed annual reports published over three decades; independent environmental surveys performed by the USEPA, by states in which NNPP facilities are located, and a thorough independent review performed by the U.S. Government Accountability Office (GAO) in 1991 (GAO 1991). The analyses summarized in this chapter are fully discussed in Appendix D, including input data and methodology, to facilitate independent verification of results.

3.11.1 The NNPP

3.11.1.1 History and Mission of the Program

The NNPP's conservative design practices and stringent operating procedures have resulted in the demonstrated safety record of naval nuclear propulsion plants. As of 2011, NNPP reactors have accumulated over 6,300 reactor-years of operation and have steamed over 145 million miles. There has never been a reactor accident, nor any release of radioactivity that has had an adverse effect on human health or the quality of the environment. The following sections provide a detailed discussion of the NNPP.

3.11.1.2 Nuclear Propulsion for Navy Ships

The source of energy for powering a naval nuclear ship originates from the fission of uranium atoms within a reactor core. Pressurized water circulating through a closed primary piping system transfers heat from the reactor core to a secondary steam system isolated from the reactor cooling water. The heat energy is then converted to mechanical energy to propel the ship and provide electrical power.

3.11.1.3 Philosophy of the NNPP

Naval nuclear propulsion plants must be militarily capable and reliable in combat, as well as safe for the environment, the public, and those who operate and service them. The NNPP's success is based on strong central technical leadership, thorough training, conservatism in design and operating practices, and an understanding that in every aspect of the NNPP, excellence must be the norm. In addition, there is recognition that individuals must accept responsibility for their actions to maintain these standards. Admiral Rickover said it this way, "Responsibility is a unique concept: it can only reside and inhere in a single individual. You may share it with others, but your portion is not diminished. You may delegate it, but it is still with you. You may disclaim it, but you cannot divest yourself of it. Even if you do not recognize it or admit its presence, you cannot escape it. If responsibility is rightfully yours, no evasion, or ignorance or passing the blame can shift the burden to someone else. Unless you can point your finger at the person who is responsible when something goes wrong, then you have never had anyone really responsible."

Since radioactive material is an inherent by-product of the nuclear fission process, its control has been a central concern for the NNPP since its inception. Radiation levels and releases of radioactivity have historically been controlled well below those permitted by national and international standards. All features of design, construction, operation, maintenance, and personnel selection, training, and qualification have been oriented toward minimizing environmental effects and ensuring the health and safety of workers, ships' crew members, and the public. Conservative reactor safety design has, from the beginning, been a hallmark of the NNPP.

3.11.1.4 Safety Record of the NNPP

The history of safe operation of the U.S Navy's nuclear-powered ships and their support facilities is a matter of public record. This record shows a long and extensive history of the NNPP's activities having no adverse effect on the environment. Detailed environmental monitoring results published yearly provide a comprehensive description of environmental performance for all NNPP facilities. Report NT-10-1 (NNPP 2011b) discusses the performance for all nuclear-powered ships and nuclear capable bases and shipyards. This record confirms that the procedures used by the NNPP to control radioactivity from U.S. Navy nuclear-powered ships and their support facilities are effective in protecting the environment and the health and safety of sailors, workers and the general public.

NNPP reactor designs have received independent evaluations from the Nuclear Regulatory Commission (NRC) and the Advisory Commission on Reactor Safeguards (ACRS). These reviews were conducted as a means to provide confirmation and added assurance that nuclear propulsion plant design, operation, and maintenance pose no undue risk to public health and safety.

In addition, in 1991 the GAO completed a thorough 14-month review of Department of Energy sites under the cognizance of the NNPP (GAO 1991). This review included full access to classified documents. The GAO investigators also made visits to the DOE laboratory and prototype sites supporting the NNPP, which operate to the same stringent standards imposed on naval facilities and activities. The GAO review concentrated on environmental, health, and safety matters, including reactor safety. In congressional testimony on April 25 1991, the GAO stated in part:

> *In the past, we have testified many times before this committee regarding problems in the Department of Energy (DOE). It is a pleasure to be here today to discuss a positive program in DOE. In summary, Mr. Chairman, we have reviewed the environmental, health, and safety practices at the Naval Reactors laboratories and sites and have found no significant deficiencies.*

The USEPA has conducted independent environmental monitoring in U.S. harbors during the past several decades. The results of these extensive, detailed surveys have been consistent with Navy results. These surveys have confirmed that U.S. Naval nuclear-powered ships and support facilities have had no significant effect on the environment (USEPA 2005b, 2005c, 2004, 2003, 2001a, 2001b, 1999a, 1998).

U.S. Navy nuclear-powered warships and their reactors are designed to exacting and rigorous standards. They are designed to survive wartime attack, include redundant systems and auxiliary means of propulsion, and are operated by highly trained crews using rigorously applied procedures. All of these features enhance reactor safety just as they contribute to the ability of the ship to survive attack in time of war.

Critical to safety are the officers and sailors who operate the naval nuclear propulsion plants aboard nuclear-powered warships. Since the 1950s, over 120,000 officers and enlisted technicians have been trained in the NNPP. The officer selection process accepts only applicants who have high standing at colleges and universities. All personnel receive 1 to 2 years of training in theoretical knowledge and practical experience on operating reactors that are like the reactors used on ships. Even after completing this training, before manning a nuclear propulsion plant watch station, the personnel must requalify on the ship to which they are assigned. In addition to the extensive training and qualification program, multiple layers of supervision and inspection are employed to ensure a high state of readiness and compliance with safety standards. When a ship's reactor is in operation at sea, there are both enlisted technicians and officers on duty, with an average total of 40 years of experience in naval nuclear propulsion.

Several other factors enhance naval reactor safety. Naval reactors are smaller and lower in power rating than typical commercial plants because naval reactors must fit aboard a warship. The smaller size and the fact that naval reactors normally operate at low power mean that, in the highly unlikely event of a problem with the reactor, less than 1 percent (<1%) of the radioactivity contained in a typical commercial power reactor could be released from a naval reactor plant. The plant is designed to withstand a wide variety of casualty conditions without damage to the reactor core or release of significant amounts of radioactivity. Naval reactors are mobile and unlimited river or seawater can be used for emergency cooling and shielding if ever needed. In the event of a nuclear reactor accident, an MTS could be towed away from populated areas, which, of course, is not the case for a fixed, land-based reactor. There are numerous ways to move an MTS including the use of tugs or other tow craft. Sufficient time exists to support safe movement in the highly unlikely event of such an occurrence. Notwithstanding the remote possibility of occurrence, the potential range of postulated nuclear accidents has been analyzed and has been reviewed with the State of South Carolina.

Consistent with past practice, the S6G nuclear propulsion plant design was independently reviewed by the NRC. This review concluded that the S6G reactor can be safely operated.

3.11.1.5 Naval Reactor Operator Training

From the inception of the NNPP, Admiral Rickover recognized that nuclear propulsion plant operators must know more than simply *what* to do in any given situation; they must also understand *why*. Thus, ever since the first crew of the USS NAUTILUS reported to the Bettis Atomic Power Laboratory for nuclear training in July 1952, naval nuclear propulsion plan operators have received in-depth technical training, both theoretical and actual hands-on experience under instruction. The number of sailors trained and qualified as nuclear propulsion plant operators since 1952 is over 120,000.

Thorough training minimizes problems, results in quick and efficient responses to emergencies, and helps ensure safety. Prospective plant operators must meet tough selection standards and successfully complete extensive nuclear propulsion training and qualification before reporting aboard a ship.

After selection for the NNPP and completion of basic recruit training, enlisted personnel are assigned to Nuclear Field “A” School in Charleston, South Carolina, for initial in-rate instruction. In addition to a preparatory course in mathematics, each student receives extensive hands-on training in equipment laboratories specially designed to teach required technical skills. The 24-week Nuclear Power School follows, providing basic academic knowledge necessary to understand the theory and operation of nuclear propulsion. The curriculum is presented at the first-year collegiate level and includes thermodynamics, reactor principles, radiological fundamentals, and other specialized subjects.

For officers, all of whom are college graduates with technical training, the first step is the 24-week graduate-level course at Nuclear Power School. Here, students receive highly technical instruction covering the prerequisite theory background before they begin hands-on training at an operating reactor plant. The subjects are mostly the same as those taught in the enlisted curriculum; however, they are taught in greater depth and also include topics such as electrical engineering and reactor dynamics.

After Nuclear Power School, both officers and enlisted personnel are assigned to one of the NNPP’s prototype propulsion plants or MTSs for 24 weeks of additional classroom training and actual watchstanding experience under instruction. Under the guidance of experienced operator instructors, students learn how to operate a naval nuclear propulsion plant during normal and potential casualty situations. Each student qualifies as a propulsion plant operator, attaining a thorough knowledge of all propulsion plant systems and their operating requirements. Before reporting aboard ship, they must qualify on their watchstation at an operating reactor.

3.11.2 Naval Nuclear-Powered Ships

In naval nuclear propulsion plants, the reactor core is installed in a heavy-walled pressure vessel within a primary shield. This shield limits exposure from gamma and neutron radiation produced when the reactor is operating. Reactor plant piping systems are installed primarily inside a reactor compartment, which is surrounded by a secondary shield. Because of these two shields, the resulting radiation outside the propulsion plant spaces during reactor plant operation is generally not any greater than background radiation (NNPP 2011c).

3.11.2.1 Reactor Design and Operation

The design and operation of naval nuclear-powered ships result in minimal risk of accidents and the consequences would be small should a problem occur. There are a number of reasons why this is so. A naval reactor aboard an MTS is rated at only a fraction of the power of a commercial nuclear power plant. The plant must also meet stringent military requirements for shock and battle conditions, and is installed within a strong hull that also must meet stringent military requirements. The operators of naval nuclear reactors are carefully selected, qualified to exacting standards, and trained to explicit procedures. Finally, the mobility of a ship provides for the removal of the problem source in the unlikely event of an accident.

Naval nuclear fuel can withstand combat shock loads that are in excess of 50 times the force of gravity, well in excess of the seismic loads a commercial plant might experience in a severe earthquake. Naval nuclear fuel routinely operates with rapid changes in power level since U.S. Navy ships must be able to change speed quickly. Naval nuclear fuel consists of solid components that are non-explosive, non-flammable, and non-corrosive. The high integrity fuel is designed to contain fission products within the fuel and prevent fission products from being released into the primary coolant. This is one of the differences from commercial reactors, which normally have a small amount of fission products released from the fuel into the primary coolant.

Strict adherence to conservative principles of design and operation of naval reactors was discussed on May 24, 1979, by the Director of Naval Nuclear Propulsion (then Admiral H. G. Rickover) in congressional testimony following the accident at Three Mile Island (U.S. House of Representatives 1979). Admiral Rickover emphasized that ensuring reactor safety is the responsibility of all personnel who work on naval nuclear propulsion plants and that each NNPP element from training, to design, to construction, and to operation must be properly carried out in a coordinated fashion to achieve the goal of safe performance.

3.11.3 Facilities that Support the NNPP

The NNPP has set standards for construction of facilities that will be used to handle or store radioactive materials. These standards prevent the spread of contamination within the facilities or to the environment, minimize exposure to personnel within the facilities, ensure that exposure to personnel outside the facilities is negligible, and minimize the effort required to decontaminate and decommission the facilities. All aspects of facility construction and future modifications are engineered.

3.11.3.1 Pre-Construction and Post-Construction Radiological Surveys

To provide a baseline for radiological information on radiological work facilities, radiation surveys of the building site, and analysis of soil and building construction material samples are performed. After construction, a radiological survey of the building is performed before any radiological work is allowed in the facility. The baseline data established by these surveys is retained to provide information needed for decommissioning the facility and returning it to its pre-radiological work condition.

3.11.3.2 Special Design Features

Standard design features for NNPP radiological facilities have been developed to minimize the potential risk to the environment, the general public, and workers, including:

- **Impermeable Floors, Walls and Liquid Containment Curbs in Radiological Work Areas**

  The floors consist of a heavy structural concrete slab topped with an impermeable surface that eliminates the possibility of migration of liquid through the floor into the underlying soils. No underground piping is permitted in or under the floors. Wherever liquids are handled, containment curbs or basins are provided to contain the largest potential spill. All floors, walls, and ceilings are smooth, free of crevices, and sealed to aid in decontamination, if necessary. Walls and roofs are tightly constructed and sealed to minimize the sources of air leakage. Doors and windows are made as leak tight as possible. All entrances to the building are ramped or sealed, where practicable, to prevent any potential inadvertent loss of contaminated liquids. Consideration for hurricane storm surge effects have been factored into building design and site arrangement specifications.

- **Radiation Shielding**

  The facilities are designed so that all exterior areas and interior non-radiological support areas have radiation levels so low that monitoring personnel for radiation exposure is not required. This is achieved by the use of radiation shielding integral to the permanent walls of the facilities as well as by the use of portable shielding as work conditions dictate.

- **Mixed Waste is Segregated and Stored in a Dedicated Storage Area**

  Mixed waste (waste that is both radiologically contaminated and chemically hazardous) is segregated into containers that hold similar (chemically compatible) wastes.

3.11.3.3 Decommissioning Facilities

Due to facility design and the control of radioactivity during operation, modern NNPP facilities can be decommissioned without any residual environmental impact. Within the past several decades, three shipyards involved in naval nuclear work have been successfully radiologically deactivated and closed. Also, one naval nuclear prototype site has been decommissioned and returned to the State of Connecticut for unrestricted use.

Extensive radiological decommissioning surveys were performed at the Charleston Naval shipyard that was near NPTU Charleston to verify the removal of radioactive material. This shipyard was deactivated following the 1993 round of base closings. Direct radiological surveys on over 5,000,000 sf of building and facility surfaces and analyses of over 40,000 samples of soil, ground cover, and concrete using sensitive laboratory equipment detected no cobalt-60 other than trace concentrations in a few localized areas. Simple, proven cleanup methods were used to remediate these areas. The total amount of NNPP radioactivity removed from the environment at the shipyard was equivalent to that in a single home smoke detector. The shipyard was released for unrestricted use with respect to NNPP radioactivity by the operational closure date of April 1, 1996, with State of South Carolina and USEPA agreement.

The successful radiological deactivation and closure of the Charleston Naval Shipyard and other shipyards demonstrates that the stringent control over radioactivity exercised by the NNPP from its inception has been successful in preventing significant radiological contamination of the environment. Personnel who subsequently occupy these facilities will not receive measurable radiation exposure above natural background levels that exist in areas not affected by naval nuclear propulsion plant work (NNPP 2011b).

3.11.4 Radiological Impact of NPTU Charleston

The following discussions characterize the radiological impacts of NPTU Charleston operations. This includes impacts due to both operating MTSs and operations related to radiological support facilities. As discussed below, the cumulative radiological impacts from NPTU Charleston operations are very small.

3.11.4.1 Source of Radioactivity

Nearly all (99 percent) of the radioactive atoms in a nuclear reactor are found in two forms: (1) the uranium fuel itself or (2) fission products created by the nuclear chain reaction. As discussed above, the fuel in naval propulsion reactor cores is designed and built with high fuel integrity to retain this radioactivity. This high fuel integrity has been confirmed by operating experience and direct examination from spent cores. Such integrity is a necessity for sailors who live in the enclosed atmosphere of a nuclear-powered ship.

The remaining radioactive atoms present in a naval nuclear reactor are encountered in two forms. The majority of the remaining radioactive atoms (99.9 percent of the remaining 1 percent) are part of the metal of the reactor plant piping and components. These radioactive atoms are created by neutron activation of iron and alloying elements during operation of the reactor plant. The balance (0.1 percent of the remaining 1 percent) is in the form of radioactive corrosion and wear products originating from metal surfaces in contact with reactor coolant. These corrosion and wear products are transported by the reactor coolant through the reactor core where they are activated by neutrons, and then deposited on piping system internal surfaces. Most of these corrosion products tightly adhere to piping system internal surfaces. The small amount that does not adhere is the source of potential radioactive contamination encountered during work on naval nuclear reactor plants. Stringent controls are used to keep this material contained when working on system internals.

Corrosion and wear products in naval nuclear reactor plants include the following radionuclides with half-lives of about 1 day or greater: tungsten-187, chromium-51, hafnium-181, iron-59, iron-55, nickel-63, niobium-95, zirconium-95, tantalum-182, manganese-54, cobalt-58, and cobalt-60. The predominant radionuclide is cobalt-60, which has a 5.2-year half-life and emits gamma radiation. Cobalt-60 also has the most restrictive concentration limit in water as listed by organizations that set radiological standards for these corrosion and wear radionuclides (10 C.F.R. § 20, *Standards for Protection Against Radiation;* USEPA 1999b). Therefore, cobalt-60 is the primary radionuclide of interest for naval nuclear propulsion plants.

3.11.4.2 Control of Radioactivity

Stringent radiological control practices are used in the NNPP. The effectiveness of these stringent radiological control practices has been proven and documented (NNPP 2011b). The following discussion outlines some of the NNPP's practices for controlling radioactivity.

3.11.4.2.1 Surface Contamination and Radioactive Liquid

Some of the most restrictive practices in the NNPP's radiological control program are those established for controlling radioactive contamination. The NNPP avoids the need for anti-contamination clothing by containing radioactivity so personnel cannot come in contact with it. Another basic requirement of contamination control is monitoring all personnel leaving an area where radioactive contamination could possibly exist. This confirms that contamination has not been spread.

Work surfaces are designed to be easily cleaned (plastic or seamless sheet metal containments) to aid in fast and effective cleanup. Work surfaces are decontaminated during and after work to maintain positive contamination control. Frequent contamination surveys are conducted during work evolutions. Results of these surveys are reviewed by supervisory personnel to ensure that no abnormal conditions exist. The instruments used for these surveys are checked for operability against a radioactive source daily, and they are calibrated at least every 12 months.

Radioactive liquids transferred from the MTSs are placed in collection tanks and are processed at a shore-side processing facility. After processing the water to remove cobalt-60 and other particulate radioactivity, the water is returned to the ships for use or evaporated. This process has been proven effective at NNPP shipyards, operating bases, NPTU Charleston, and other facilities.

3.11.4.2.2 Airborne Radioactivity

As noted, naval fuel elements are designed to retain all fission products, including radioactive gases. Very minute amounts of fission products are created from fission that occurs naturally in trace amounts of uranium in the fuel cladding. Because these amounts are extremely small, there is no need for special equipment to remove or control fission products.

Special controls are used in areas where radioactive corrosion and wear products could become airborne to prevent their release into the environment. Airborne radioactivity is controlled during maintenance so contamination is contained and respiratory equipment is not normally required. To prevent exposure of personnel to airborne radioactivity, and to prevent radioactivity from escaping to the atmosphere, work that might generate airborne contamination is performed inside sealed containments. These containments are ventilated to the atmosphere only through high-efficiency particulate air (HEPA) filters. Airborne radioactivity surveys are performed regularly in radioactive work areas. If airborne radioactivity above the limit is detected in occupied areas, work that might be causing airborne radioactivity is immediately stopped, and the potential source is identified and contained.

The results of air particulate sampler (APS) monitoring show that the average concentration of radioactivity and the total radioactivity in the air released from NNPP radiological facilities are consistently lower than that measured in ambient air away from the monitored facilities. In other words, there is less radioactivity in the filtered air exhausted from an NNPP radiological work facility than was originally in the air brought into the facility. Releases from these work facilities cause minute levels of radiation exposure far below that allowed by the USEPA in 40 C.F.R. § 61. These results clearly demonstrate that the design features used in NPTU Charleston radiological facilities are effective in preventing release of airborne radioactivity.

All liquid collection tanks used to store radioactivity are sealed by mechanical closures except for one penetration. This penetration vents any small pressure build-up caused by filling or draining and by atmospheric pressure or ambient temperature changes. A HEPA filter on the penetration ensures that airborne radioactivity is retained in the tanks.

3.11.4.3 Radiological Control Practices

Besides the contamination control practices listed above, several other key radiological control practices used by the NNPP provide additional assurance that positive control of radioactivity is maintained. Among those NNPP-wide practices are the following:

- A radioactive materials accountability system is used to ensure that no radioactive material is lost or misplaced.
- All radioactive materials are specially packaged, sealed, and tagged with yellow and magenta tags bearing the standard radiation symbol and the measured radiation level. The use of yellow packaging material is reserved solely for radioactive material.
- Access to radiological facilities is controlled by trained radiological control personnel. In addition, all personnel entering radiological work and storage areas of the facilities are required to wear dosimetry devices.
- Only specially trained personnel are authorized to handle radioactive materials.
- Radiological surveys are conducted by qualified radiological control personnel inside and outside of facilities and ships where radiological materials are handled. This is a check to verify that the methods used to control radioactivity are effective.
- Written procedures are used to perform all radiological work. This not only ensures the work is carefully planned and documented, but also allows situation-specific radiological controls to be used. All written procedures are strictly adhered to word for word (i.e., verbatim compliance) in the NNPP. If this cannot be done, work is stopped until a change to the procedure is approved.
- Radioactive material or radioactive waste transported off-site is packaged and shipped per DOT regulations by specially trained personnel.

- Technical problems encountered during radiological work are documented and corrected before work is allowed to continue.

3.11.4.3.1 Occupational Radiation Exposure

The NNPP invokes stringent controls on occupational radiation exposure. The NNPP's policy is to reduce to as low as reasonably achievable the exposure to personnel from ionizing radiation associated with naval nuclear propulsion plants. These stringent controls on occupational radiation exposure have been successful.

The current Federal annual occupational exposure limit of 5 roentgen equivalent man (rem) established in 1994 came 27 years after the NNPP's annual exposure limit of 5 rem per year was established in 1967. (Until 1994, the Federal radiation exposure limit allowed an accumulation of exposure of 5 rem for each year of age beyond 18.) From 1968 to 1994, no civilian or military personnel in the NNPP exceeded its self-imposed 5 rem annual limit, and no one has exceeded that Federal limit since then. In fact, no NNPP personnel have exceeded 40 percent of the NNPP's annual limit between 1980 and 2010 (i.e. no personnel have exceeded 2 rem in any of the last 30 years). And no civilian or military NNPP personnel have ever, in over 50 years of operation, exceeded the Federal lifetime limit.

The average occupational exposure of each person monitored since 1954 for radiation associated with naval nuclear propulsion plants is less than 0.130 rem per year. For comparison, the amount of radiation exposure a typical person in the U.S. receives each year from natural background radiation is 0.3 rem. The total lifetime average radiation exposure from radiation associated with naval nuclear propulsion plants for this 57 year period is about 1 rem per person (NNPP 2011c).

3.11.4.3.2 Radioactive Solid Waste Disposal

The amount of low-level radioactive solid waste generated during MTS and maintenance facility operations is small in comparison to other waste generators. This waste includes radioactively contaminated rags, plastic bags, paper, filters, and scrap materials resulting from work aboard ship and in the shore-side support facilities. Liquids that cannot be processed for reuse are solidified and disposed as low-level radioactive waste. Low-level radioactive waste is packaged in DOT-approved containers, shielded if necessary, and accumulated in a controlled storage area until it can be shipped for disposal at a burial site that is licensed either by the NRC or by a State under agreement with the NRC.

The annual volume of solid low-level radioactive waste generated by all naval nuclear-powered ships and their support facilities in 2010 could be contained in a cube measuring about 10 yd on a side. The total annual volume is less than 1 percent of the total volume of solid low-level radioactive waste buried at the sites in the State of Washington, South Carolina and Utah each year (NNPP 2011b). The amount of radioactive waste generated by the Navy at NPTU Charleston facilities is less than 0.3 percent of the Navy total.

3.11.4.3.3 Mixed Hazardous and Radioactive Waste

Hazardous waste is waste that poses a potential threat to human health or the environment if not properly managed. These substances can be toxic, corrosive, ignitable, or chemically reactive (note that this does not include radioactive substances regulated under the Atomic Energy Act). Radioactive waste is a waste that contains radionuclides regulated under the Atomic Energy Act. Mixed waste generated as a result of NNPP activities is a mixture of chemically hazardous waste and low-level radioactive waste. Within the NNPP, concerted efforts are taken to prevent commingling radioactive and chemically hazardous substances to minimize the potential for generation of mixed waste. Examples of these efforts include avoiding the use of hazardous solvents, lead-based paints, and lead shielding in disposal containers. As a result of NNPP efforts to avoid the use of chemically hazardous substances in radiological work, each year NNPP activities typically generate less than 20 cubic meters (or 706 cubic feet) of mixed waste that requires offsite treatment following completion of onsite processing. Small quantities of mixed waste generated as a result of NNPP activities at NPTU Charleston are stored in accordance with federal and South Carolina hazardous waste regulations. Limited treatment allowed by generators of hazardous waste is performed on some mixed wastes. This treatment is performed in accordance with federal and South Carolina regulations. Mixed wastes are stored on-site pending off-site shipments for treatment and disposal. Detailed characterization of NNPP mixed waste has been accomplished using sampling and extensive process knowledge, and has confirmed that the waste is suitable for safe storage until it is shipped off site for treatment and disposal (NNPP 2011b). During the transition to the newer MTSs, the amount of mixed waste generated would temporarily increase up to 30 cubic feet. Once the transition is completed, it is anticipated that mixed wastes would average about 20 cubic feet per year.

3.11.4.3.4 Radioactive Material Transportation

Only specially trained and designated people, who are knowledgeable in shipping regulations, are permitted to authorize shipments of radioactive material. Special transportation services, such as signature security service or sealed shipping vehicles are used to transport radioactive material. These services ensure point-to-point control and traceability are maintained from shipper to receiver.

Shipments of radioactive material in the NNPP are made per regulations of the DOT, DOE, and NRC. These regulations ensure shipments of radioactive material are controlled to protect the environment and the health and safety of the general public, regardless of the route or mode of transportation taken.

Shipments of radioactive material associated with naval nuclear propulsion plants have not resulted in any measurable release of radioactivity to the environment. There have never been any significant accidents involving a release of radioactive material during shipment of NNPP radioactive waste. In 2009, one vehicle accident occurred involving a shipment of demolition debris from Knolls Atomic Power Laboratory's Kesselring Site, where the shipping trailer overturned on an interstate highway and spilled a portion of the debris onto the median. The shipment contained a small amount of radioactivity below the limits set by the DOT Hazardous Material Regulations. In cooperation with State and local officials, NNPP personnel rapidly responded to remove the trailer, clean up all of the debris, and restore the damaged area in the median, all within 24 hours from the start of the event. Surveys of the area confirmed no measurable spread or radioactivity occurred.

Estimates of annual radiation exposure to transportation crews and the general public from shipments of radioactive material have been made in a manner consistent with that used by the NRC (ANSR 2002). As discussed in reference NNPP 2011b, NNPP shipments have not resulted in any significant exposure to the general population. The maximum exposure to any individual member of the public is far less than that received from natural background radioactivity.

3.11.4.4 Radiological Environmental Monitoring Program

To provide additional assurance that procedures used by the U.S. Navy to control radioactivity are adequate to protect the environment, the NNPP conducts environmental monitoring in the Cooper River near the MTSs and in harbors frequented by its nuclear-powered ships. Environmental monitoring surveys for radioactivity are periodically performed where U.S. Navy nuclear-powered ships are built or overhauled and where these ships have homeports or operating bases. Samples from each site monitored are also checked at least annually by a DOE laboratory to provide a further check on the quality of the environmental sample analyses results. The DOE laboratory findings have been consistent with those of NPTU Charleston (NNPP 2011b).

3.11.4.4.1 Marine Monitoring

Marine monitoring consists of analyzing river water, sediment, and marine life for radioactivity associated with naval nuclear propulsion plants. This monitoring is supplemented by shoreline surveys. Sampling river water and sediment each quarter year is emphasized since these materials would be the most likely to be affected by releases of radioactivity.

Sediment samples are collected and analyzed specifically for the presence of cobalt-60, which, as discussed earlier, is the predominant radionuclide of environmental interest resulting from naval nuclear reactor operations. Sampling points are selected to form a pattern around MTS berthing locations and to provide points in areas away from berthing locations. These sampling points consider characteristics of the site. Summary of 2009 surveys for cobalt-60 sampling show no detectable levels of cobalt-60 in sediment. The detectable level of cobalt-60 for Navy radiological surveys is less than 0.01 picocuries per gram. The actual value varies depending on the amount of naturally occurring radioactivity in the survey sample. Since 1970, nuclear-powered warship operations have not caused any increase in the general background radioactivity in the environment.

River water samples are taken once each quarter in areas where the MTSs are berthed, and from upstream and downstream locations. No cobalt-60 has been detected in any of the water samples.

Marine-life samples, such as mollusks and crustaceans have been taken from the Cooper River. No buildup of cobalt-60 has been detected in these samples of marine life.

Shoreline areas uncovered at low tide are surveyed with sensitive gamma scintillation detectors to determine if any radioactivity from bottom sediment has washed ashore. The results of these surveys are consistent with natural background radiation levels in these regions. Thus, there is no evidence that these areas are being affected by MTS operations.

3.11.4.4.2 Air Monitoring

Naval nuclear reactors and their support facilities are designed to ensure that discharges of radioactivity are well below USEPA regulatory limits (40 C.F.R. § 61) in airborne exhausts. Radiological controls, such as the use of containments, special ventilation, frequent radiological monitoring when work is in progress, frequent decontamination of work containments to maintain positive control of radioactive contamination, and HEPA filtration systems, serve to prevent significant radioactivity from becoming airborne. The total air emission from the NPTU radiological support facility and MTSs is less than 1 percent of the applicable USEPA (40 C.F.R. § 61) limits. In fact, comparison of sensitive radioactivity measurements at NNPP radiological facilities demonstrates that air exhausted from naval nuclear propulsion facilities contained a smaller amount of radioactivity than was present in the ambient air outside the facilities.

3.11.4.4.3 Perimeter Monitoring

Ambient radiation levels are measured using sensitive thermoluminescent dosimeters continuously posted at locations outside of the boundaries of areas where radiological work is performed. Dosimeters are also posted at locations away from radiological work areas to measure background radiation levels from natural radioactivity. The results show that NNPP activities have had no distinguishable effect on normal background radiation levels at the perimeter of the NPTU Charleston site.

3.11.4.4.4 Independent Agency Monitoring

Environmental samples from NPTU Charleston are also independently checked at least annually by a DOE laboratory to ensure that analytical procedures are correct and standardized. Additionally, the USEPA has conducted independent surveys in U.S. harbors, including areas on both the east and west coast (USEPA 2005b, 2005c, 2004, 2003, 2001a, 2001b, 1999a, 1998). The results are consistent with Navy monitoring results cited in NNPP 2011b. These surveys have confirmed that naval nuclear-powered ships and their support facilities have had no adverse impact on the radioactivity of the marine or terrestrial environment.

3.11.4.4.5 Results of Environmental Monitoring

The Navy issues an annual report that describes the Navy's policies and practices regarding such issues as disposal of radioactive liquid, transportation and disposal of radioactive materials and solid wastes, and monitoring of the environment to determine the effect of nuclear-powered warship operations (NNPP 2011b). This report is provided to Congress and to cognizant federal and state officials and areas frequented by nuclear-powered ships. This report concludes that operation of naval nuclear vessels including MTSs has no significant radiological environmental effect, and no adverse impact on the health and safety of the public.

3.11.5 Non-Radiological Impacts of the MTS

The following discussions characterize the non-radiological impacts of NPTU Charleston operations. This includes impacts due to both operating MTSs and operations related to non-radiological support facilities. As discussed below, the cumulative non-radiological impacts from NPTU Charleston operations are small.

3.11.5.1 Releases to Surface Water from MTSs

Thermal release to the Cooper River

Most of the energy produced by the operations of the MTS reactors is released to the surrounding water in which the ships are moored. Some of the energy in the steam produced by the reactor plant is transmitted through the ship's main engine turbine to a water break which simulates the action of a propeller without producing thrust on the ship. The steam which passes through the main engine turbine and electrical generating turbines is condensed back into water by transferring its energy to river water pumped through condenser tubes.

The maximum total thermal discharge to the Cooper River would be less than 500 million British thermal unit (Btu) per hour during the transition to the replacement MTSs when there could be three MTSs operating simultaneously. The long-term heat discharged after the transition to S6G-MTSs will be approximately 400 million Btu per hour. The heat discharged from each ship is well mixed with ambient water by the action of the water break and local water currents. The estimated size of the mixing zones and the overall average temperature rise of the average river temperature are described below.

The average temperature rise due to operation of three MTS reactors and propulsion plants has two aspects: the overall rise of the temperature of water returned to the river during ebb tide (estimated to be less than 0.09 degrees Fahrenheit [F]), and the local rise in water temperature during flood tide in the upper portion of the Cooper River, upstream of NPTU Charleston (estimated to be less than 0.057 degrees F).

The difference is due to the relative volumes of tidal flow that pass NPTU Charleston during the entire tidal cycle and during the flood tide alone. In the vicinity of any of the MTSs, the local temperature rise may amount to a few degrees within the mixing zone.

In each case, the average temperature rise is estimated from the ratio of the heat input to the tidal flow during the tidal cycle. During the flood-tide cycle, the heated water is mixed and carried upstream, and the temperature rise is estimate to be less than 0.057 degrees F. During the ebb-tide portion of the cycle, the heated water is mixed and carried downstream and subsequently out to the Atlantic Ocean. The overall rise in temperature is the result of two sequential heat loads. The first one would go upstream during the flood-tide, the second would be added to the heat content of the river during the following ebb-tide. The resulting temperature rise is estimated to be less than 0.097 degrees F.

These average temperature rises are all quite low and well below the allowable summer limit of 1.5 degrees F at the boundary of the mixing zone (4 degrees F winter), as prescribed by the SCDHEC for plants along the river using its water for cooling purposes.

Near the cooling water discharge locations, a zone would exist where the heat would be dispersed by mixing with the surrounding water. Beyond the mixing zone, the temperature rise of the waters would be less than the regulatory limits, particularly the summer limit of 1.5 degree F. The estimated sizes of the mixing zones are small fractions of the river area; this is consistent with the need to assure the protection and propagation of balanced, indigenous population of marine fauna and flora.

Three cases were calculated to estimate the range of sizes for the mixing zones, and to indicate how the sizes would compare to current operating conditions:

1. Current Conditions: simultaneous full-power operation of two S5W MTSs.
2. Transition Period: simultaneous full-power operation of three MTSs (two S6G and one S5W MTS design).
3. Long Term: simultaneous full-power operation of two replacement S6G MTSs.

The results of these calculations are shown in Table 3.11-1. For each of the cases, the table shows the amount of heat that would be discharged to the river and the estimated effects on the river in terms of:

- The size of the mixing zone, expressed as the perpendicular distance away from the hull to the estimated location beyond which the temperature rise would be less than 1.5 degrees F.
- The fraction of the flow area in the river that would be required for the heat to be absorbed with a rise in temperature of 1.5 degrees F
- The fraction of the surface width of the river that would be occupied by the mixing zone.

Table 3.11-1 Estimated Sizes of the Mixing Zones[1]

Case	Total Thermal Discharge (M Btu/hr)	Mixing Zone Width (ft)	Fraction of River Area (%)[2]	Fraction of River Surface (%)[3]
Current Conditions Two S5W MTSs	250	32.5	7	5
Transition Period Two S6G and One S5W MTSs	500	65	13	11
Long Term Two S6G MTSs	400	65	13	11

Notes:

1. Based on 4,500 cubic ft per second freshwater flow into Cooper River, 1.5 degree F temperature rise, 39,400 sq ft of river area, 40 ft depth of mixing zone, and equal discharges to port and starboard. Width of zone on each side.
2. Width of river is 1,200 ft.
3. The minimum distance between discharge locations indicates that the mixing zones are not additive.

The size of the mixing zone was estimated from a heat balance between the thermal discharge and the fraction of the flow of the river that would be required to absorb the heat with a temperature rise of 1.5 degrees F.

A bow-to-stern arrangement of MTSs on the extended berthing pier X-Ray North results in the closest location of discharges from the MTSs. This distance is approximately 410 ft. Other orientations of MTSs at pier X-Ray North and the distance between MTSs moored at pier X-Ray North and X-Ray South would result in a larger separation of mixing zones.

Tidal flows would affect each mixing zone similarly, and would tend to extend each mixing zone in the direction of flow, making each mixing zone somewhat narrower. No credit was taken for any tidal effect on the mixing zones, but the effects are expected to be beneficial in terms of making the mixing zones smaller as a result of further mixing by the tidal flow.

Since the estimated size of the mixing zones are relatively small in comparison to the size of the river and the distances separating the locations of the thermal discharges, the environmental effects on local communities of marine life are expected to be correspondingly small.

The SCDHEC has issued NPDES permit SC0043206 for water discharges from the existing MTSs. NPTU Charleston will submit a request to modify the permit to allow for the temporary operation of three MTSs. The current permit allows NPTU Charleston to discharge non-contact, non-radioactive cooling water, containing low levels of added chlorine, to the Cooper River. The chlorine, which is added as calcium hypochlorite, is used to prevent the fouling of heat exchanger surfaces. NPTU Charleston conducts twice monthly monitoring to verify compliance to the permit and files a monthly monitoring report to SCDHEC. As specified in the permit, temperature is measured within a 250-ft perimeter, and pH (measurement of the acidity or alkalinity of the water) as well as total residual chlorine is measured within a 5-ft zone next to each MTS. Monitoring conducted since operation of the MTSs began has demonstrated NPTU Charleston's compliance with the terms of the permit.

As described above, the thermal output of the MTS reactor plants is essentially released to the Cooper River. There are no significant direct thermal releases to the atmosphere.

As previously described, turbulent energy would be released to the Cooper River as a result of the operation of the water brake. Soundings of the river bottom by NPTU Charleston have shown that the turbulence caused by the water break has not caused erosion of the river bottom. The use of the same design water break for the replacement S6G-MTSs is expected to result in similar minor depressions in the siltation under the water break as seen with the current S5W MTSs.

Small amounts of potable water are also used to pressurize seals on the main engine shaft that provide lubrication and prevent leakage.

3.11.5.2 Discharges to Sanitary Sewer from MTSs

Steam generator blowdown effluents are directed to collection tanks where the water is allowed to cool prior to being discharged to the site sanitary sewer system. Sanitary wastes from the MTSs are also discharged to the sanitary sewer system.

In addition, bilge water from machinery spaces is collected and processed through an oil-water separator unit that removes the oil for separate management. Processed water is then pumped through a polishing clay bed to further remove remaining impurities. An oil monitor at the outlet of the clay bed secures system flow if oil content approaches the JB CHS-W pre-treatment permit limits. Due to the age of the existing S5W MTSs, the MTSs contain materials with PCBs. The S6G MTSs although newer, still have the potential for PCB-containing materials. Sampling of oil-water separation system effluent demonstrates that USEPA limits specified in 40 C.F.R. § 761.79 for discharge to the sewer system are met. The oil from the oil-water separator is sampled for PCBs and recycled, or disposed of as regulated waste, in accordance with applicable USEPA and SCDHEC requirements.

The collection tanks for the existing MTSs are located on support barges moored adjacent to the MTSs. NPTU Charleston plans to include new collection tanks in the proposed TSB 2. Moving the collection and processing of MTS waste water to a shore-based facility will eliminate interruptions to MTS operations that occur to prepare for approaching hurricanes. Discharges from the replacement MTSs will be similar to the existing MTSs. The average daily discharge volume from the MTSs to the sanitary system is expected to increase from approximately 5,200 gpd to 7,700 gpd when there are three MTSs in operation. Long term discharges are expected to return to approximately 5,200 gpd when two S6G MTSs are operating. The existing sanitary infrastructure will support this volume of discharge. The discharge is not expected to have any impact on the Berkeley County Water and Sanitation Authority.

3.11.5.3 Releases to Atmosphere from MTSs

Releases to the atmosphere during normal operations include the exhaust gases from two diesel-powered emergency generators from each ship. These generators provide back-up power in the event of an outage in the normal supply from steam driven turbine generators on the ship or commercial power supplied from shore. As back-up power supplies, the generators are not normally operated; however, they are occasionally operated for training, maintenance, and test purposes to ensure they will operate as needed during emergency conditions. The existing diesel generators are listed in the JB CHS-W conditional major air quality permit that allows the generators to be operated up to 500 hours per year. A permit amendment will be requested to add the generators for the additional MTS during the transition to the newer MTSs. The newer S6G MTSs will have the same make and model generators as the existing S5W MTSs; however, the newer S6G MTSs will operate on ultra-low sulfur diesel fuel (less than 15 ppm sulfur). The generators on the S6G MTSs have been granted a National Security Exemption under 40 C.F.R. § 94.908.

Table 3.11-2 lists the expected annual emissions before, during, and after the transition to the replacement MTSs when three MTSs could be operating simultaneously.

Table 3.11-2 Estimated Annual Emissions to the Atmosphere from MTS Diesel Generators (kilograms)

Category	Current S5W MTSs (kg)	With Three MTSs (kg)	With Two S6G MTSs (kg)
Particulates	900	1,250	800
Sulfur oxides (SO_x)	1,100	1,150	600
Carbon monoxide (CO)	2,000	2,200	1,200
Nitrogen oxides (NO_x)	9,000	12,500	8,000

3.11.5.4 Other Non-Radiological Wastes

In addition, there would be occasional releases of fumes from cleaning solvents, paint, and other industrial processes similar to those from other ships and industrial activities. The MTSs have asbestos containing insulation and other materials. NPTU Charleston conducts maintenance involving asbestos containing materials in accordance with applicable SCDHEC requirements to ensure that no airborne asbestos is released from the ships.

Routine releases of non-radioactive materials to the atmosphere from the MTSs would have no significant adverse environmental impact.

3.11.6 Emergency Preparedness

Naval reactors are designed and operated in a manner that is protective of the crew, the public, and the environment. It is important to note that crews on commissioned ships live in very close proximity to the reactor and are dependent on the energy generated by the reactor for air, water, heat, and propulsion. Thus, it is imperative to both the Navy and the crew that the reactor be well designed and safely operated. An equally important part of ensuring safety is developing, exercising, and evaluating the ability to respond to any emergency in the highly unlikely event one does occur.

Planning for emergencies is based on extensive NNPP technical analysis, as well as recommendations and guidance provided by numerous agencies experienced in emergency planning, including the Department of Homeland Security (Federal Emergency Management Agency), Navy, DOE, NRC, USEPA, NCRPM, and International Atomic Energy Agency. Emergency planning for the public is based on the above guidance, as well as specific planning requirements of local civil authorities.

All NNPP activities, both shipboard and ashore, have plans in place that define NNPP responses to a wide range of emergency situations. These plans are regularly exercised to ensure that proficiency is maintained. These exercises consistently demonstrate that NNPP personnel are well prepared to respond to emergencies regardless of location. Actions are taken to continually evaluate and improve emergency preparedness at all NNPP activities.

If there ever were a radiological emergency, civil authorities would be promptly notified and kept fully informed of the situation. With the support of NNPP personnel, local civil authorities would determine appropriate public actions, if any, and communicate this information via their normal emergency communication methods.

The NNPP maintains close relationships with civil authorities to ensure communications and emergency response are coordinated, if ever needed. Periodic exercises are conducted with all states that host naval nuclear-powered warships and facilities, including South Carolina, demonstrating the Navy's commitment to work as a team in response to emergency situations.

Due to the unique design and operating conditions of naval nuclear-powered ships, civil emergency response plans that are sufficient for protecting the public from industrial and natural events (for example, chemical spills or earthquakes) are also sufficient to protect the public in the highly unlikely event of an emergency onboard a nuclear-powered ship or at an NNPP facility.

3.11.7 Overview of Radiological Impact Analyses and Health Effects

This section has discussed at length the history and philosophy of the NNPP to illustrate the absence of any notable radiological impact associated with operation of MTSs and other nuclear-powered ships. Discussion has centered on the small amount of radioactive material that could be released during normal operations and the conservative nature of naval fuel design and facilities design that make the likelihood of accidents and their consequences extremely small. Nonetheless, the radiological impacts of normal operations and facility accidents on the environment and exposure to the general public were evaluated at NPTU Charleston and are described in detail in Appendix D. These evaluations were performed taking into account local meteorological data, population, water movements, and other factors that could influence severity of an accident using computer programs for a pathways analysis. Estimated environmental consequences, event probabilities, and risk for both normal operations and postulated accident scenarios related to the NPTU Charleston radiological facility operations are presented below.

3.11.7.1 Potential for Release of Radioactive Material to the Environment

Normal operations and accidents at support facilities were evaluated to estimate the potential for releases of radioactive material. The results of these analyses are presented in terms of the predicted health effects to facility workers and the public due to the hypothetical release of radioactive materials into the environment. Effects on environmental factors are also presented, based on the amount of land that could be impacted due to postulated accidents. The detailed analyses of normal operations and accident conditions for radiological support facilities are presented in Appendix D. The radioactive material release source term for normal operations was conservatively estimated for the MTSs based on procedures approved by the USEPA for compliance with 40 C.F.R. § 61.

Accidents were considered for inclusion in detailed analyses if they were expected to contribute substantially to risk (defined as the product of the probability of occurrence of the accident and the consequence of the accident). The following example serves to illustrate the calculation of risk. The lifetime risk of dying in a motor vehicle accident can be computed from the likelihood of an individual being in an automobile accident and the consequences or number of fatalities per accident. There were 5,505,000 motor vehicle accidents during 2009 in the U.S. resulting in about 33,808 deaths (National Highway Traffic Safety Administration 2010). Thus, the probability of a person being in an automobile accident is 5,505,000 accidents divided by 308,745,538 persons in the U.S., or 0.02 per year. The number of fatalities per accident, 0.006 (33,808 deaths divided by 5,505,000 accidents), is less than 1 since many accidents do not cause fatalities. Multiplying the probability of the accident (0.02 per year) by the consequences of the accident (0.006 deaths per accident) by the number of years the person is exposed to the risk (78.2 years is considered to be an average lifetime as of 2009 [National Vital Statistics Report 2011]) gives the risk for any individual being killed in an automobile accident. From this calculation, the overall risk of someone dying in a motor vehicle accident is about 1 chance in 110 over their lifetime. Further perspective on the calculation of risk can be found in Section 1.5 of Appendix D.

Accidents were categorized into three types: Abnormal Events, Design Basis Accidents, or Beyond Design Basis Accidents. These categories are characterized by their probability of occurrence as described further in Section 2.6 of Appendix D. Construction and industrial accidents are included in these categories. Three hypothetical accidents were analyzed using area specific data. The first scenario is a fire in the NPTU Charleston radiological support facility that spreads to radioactive material resulting in an airborne release of radioactivity. The second scenario is a spill of radioactive liquid from the NPTU Charleston radiological water processing facility into the Cooper River. The third scenario is a spill of radioactive water purification media into the Cooper River during a transfer from an MTS to a shipping container.

3.11.7.1.1 Normal Operation

This section summarizes the detailed pathways analyses described in detail in Appendix D to determine the radiological impact of normal operations based on two S6G MTSs and one S5W MTS.

Table 3.11-3 presents the estimated risk of cancer to the general population and individuals at NPTU Charleston due to radiological releases from normal operations. The normal incidence of cancer for a typical population has been included for comparison. Details for deriving data in Table 3.11-3 are described in Appendix D. The radiation exposure to the general public from normal operations would be so small at NPTU Charleston that it would be indistinguishable from naturally occurring background radiation. The results show that the additional annual individual risk of cancer occurring in the general population within 50 miles of NPTU Charleston, even during the transition to newer MTSs when three MTSs would be in operation, would be very low; less than 1 chance in 68 billion.

Table 3.11-3 Radiological Health Effects from Normal Operations

NPTU Charleston	Total Radiation Exposure to Affected Population[1]	Annual Risk of Single Cancer in Entire Affected Population[2]	Population Estimate Within 50 Miles of NPTU Charleston[3]	Average Annual Risk of Cancer to a Member of the General Population[4]	Individual Annual Risk of Cancer for Maximally Exposed Off-Site Individual[5]	An Individual's Annual Risk of Dying from all Cancers[6]
Current Operation (2 S5W MTSs)	1.1×10^{-2} person-rem	1 in 170,000 (5.9×10^{-6})	648,975	1 in 110 billion (9.1×10^{-12})	1 in 370 million (2.7×10^{-9})	1 in 193 (5.2×10^{-3})
Transition Period (2 S6G + 1 S5W MTSs)	1.7×10^{-2} person-rem	1 in 100,000 (9.6×10^{-6})	648,975	1 in 68 billion (1.5×10^{-11})	1 in 200 million (4.9×10^{-9})	1 in 193 (5.2×10^{-3})
Long Term (2 S6G MTSs)	1.4×10^{-2} person-rem	1 in 130,000 (7.9×10^{-6})	648,975	1 in 82 billion (1.2×10^{-11})	1 in 260 million (3.9×10^{-9})	1 in 193 (5.2×10^{-3})

Notes:

1. Total exposure to general population within a 50-mile radius of the facility due to normal operation (person rem).
2. Annual risk of a single cancer in entire affected population within a 50-mile radius of the facility from radiation exposure due to normal operation is calculated by multiplying the total radiation exposure to affected population (rem) by 0.00055 cancers estimated to be caused by each rem (risk/rem; see Table D-3 in Appendix D).
3. Estimated number of people within a 50-mile radius of the facility from census data in Table F-4
4. Average annual risk of cancer for an average individual within a 50-mile radius of the facility from radiation exposure due to normal operation is calculated by dividing the total population cancer risk by the number of people within a 50- mile radius of NPTU Charleston. Risk of cancer is noted in parentheses.
5. The MOI is a theoretical individual living at the base boundary receiving maximum exposure, calculated by multiplying the total radiation exposure to the MOI (rem; see Table D-11 of Appendix D) by 0.00055 cancers estimated to be caused by each rem (see Table D-3 in Appendix D).
6. Annual risk of an individual dying from all sources of cancer. Risk of cancer is noted in parentheses.

3.11.7.1.2 Hypothetical Accident

Accident Selection and Scope

Natural and human initiated accidents were considered but only those accidents expected to contribute substantially to risk (defined as the product of the probability of occurrence of the accident multiplied by the consequence of the accident) were included for detailed analysis. In addition, before an accident was considered for detailed analysis, radioactive material associated with the accident had to be in a dispersible form and there had to be a way to release and disperse the material.

Categories of accidents, which are described in Appendix D and include industrial and catastrophic accidents, are characterized by their probability of occurrence. The probability of an accident's occurrence contributed significantly to whether the accident was included for detailed analysis. Accidents with minimal consequences, such as small-volume releases, procedural violations, and other human errors, occur more frequently than accidents with severe consequences. Accidents with low probability of occurrence but more severe consequences, such as acts of terrorism, plane crashes, and natural disasters (like earthquakes or hurricane storm surge), are expected to result in risks that are bounded by the results of facility accidents that were evaluated in detail. The facility accidents found to have the highest risk were a fire in a radiological support facility, a release of radiological liquid (spill) from a support facility and a release (spill) of radioactive water purification material during discharge from the ship. These accidents are analyzed in detail in Appendix D.

For facility accidents, the scope of radiological impact as related to the size of the area contaminated was determined. The spread of contamination was calculated using average meteorological conditions (note that 95 percent worst case meteorology was used when calculating exposure and risk to workers and the general population). For the fire accident scenario the contaminated area was confined to the boundaries of JBS Charleston within areas normally controlled by NPTU Charleston during radiological events. For the liquid spill accidents, the footprints were not calculated due to the rapid dilution below detectable levels of radioactive material after entering surrounding waters. Any radiological impact on the contaminated area would be temporary while the area was isolated and remediation efforts were completed.

Summary of Accidents Selected for Detailed Analysis

Fire

The accident with the most risk is a fire in a radiological support facility that results in the airborne release of radioactivity. The amount of radioactivity released during this accident scenario was conservatively established at 1 curie of cobalt-60 with the proportional amounts of other radioactive elements expected to be present with the cobalt 60. Note that this amount of activity is more than 500 times the annual amount released to harbors within the 12-mile coastal waters by the entire U.S. Navy. This represents a conservative amount of radioactivity that might be released in a fire, as compared to the typical amount that might accumulate within the NPTU Charleston radiological support facility due to normal operations. For the analysis, several conservative assumptions were used, as follows:

- The meteorological conditions are considered to be 95 percent worst case (with no credit given that the likelihood of these conditions is only 1 chance in 20).
- No evacuation of the public or cleanup of contaminated areas is assumed.

These assumptions are conservative since radioactive material storage facilities are specifically constructed to inhibit the spread of fire and have automatic sprinkler systems installed. Moreover, emergency response measures include provisions for immediate response to any emergency, identification of the accident conditions, and communications with state and local authorities.

This section summarizes the detailed pathways analyses, described in detail in Appendix D, which determined the radiological impact of a fire at the NPTU Charleston radiological support facility. Table 3.11-4 presents the estimated risk of cancer to the general population and individuals due to radiological releases resulting from a fire at the support facility. The risks presented in this section result from extremely conservative assumptions and analyses. A fire is the highest risk, most severe hypothetical accident, but its risk is still considered low when compared to other risks. Additional cancers are not expected in the general public as a result of this hypothetical radiological fire. The average annual individual risk of cancer to the general public living within a 50-mile radius of NPTU Charleston due to a fire is very low, less than one chance in 740 million.

Table 3.11-4 Summary of Radiological Support Facility Fire Results

Location	Total Radiation Exposure to Affected Population from a Fire[1]	Annual Risk of Single Cancer in Entire Affected Population from a Fire[2]	Population Estimate Within 50 Miles of NPTU Charleston[3]	Average Annual Risk of Cancer to a Member of the General Population from a Fire[4]	Individual Annual Risk of Cancer for a Maximally Exposed Off-Site Individual from a Fire[5]	An Individual's Annual Risk of Dying from all Cancers[6]
NPTU Charleston	320 person-rem	1 in 1,140 (8.8×10^{-4})	648,975	1 in 740 million (1.4×10^{-9})	1 in 9 million (1.1×10^{-7})	1 in 193 (5.2×10^{-3})

Notes:

1. This is the total exposure to affected population within a 50-mile radius of the facility due to a fire (personrem).
2. Annual risk of a single cancer in the affected population within a 50-mile radius of the facility from radiation exposure due to a fire is calculated by multiplying the total radiation exposure to affected population (rem) by 0.00055 cancers estimated to be caused by each rem (see Table D-3 in Appendix D) by a 1 in 200 (0.005) probability of a fire.
3. This is the estimated number of people within a 50-mile radius of the facility from census data in Table D-4 in Appendix D.
4. Average annual risk of cancer for an average individual within a 50-mile radius of the facility from radiation exposure due to a fire is calculated by dividing the affected population cancer risk by the number of people within a 50- mile radius of NPTU Charleston. Risk of cancer is noted in parentheses.
5. The MOI is a theoretical individual living at the base boundary receiving maximum exposure. Risk is calculated by multiplying the total radiation exposure to the MOI (rem, see Table D-11 of Appendix D) by 0.00055 cancers estimated to be caused by each rem (see Table D-3 in Appendix D) by a 1 in 200 (0.005) probability of a fire.
6. This is the annual risk of an individual dying from all sources of cancer. Risk of cancer is noted in parentheses.

Radioactive Purification Media Spill

The accident with the second highest risk is a spill of purification media during the transfer of this radioactive material from the ship to a transportation cask into surrounding waters. The released radioactivity is evaluated for transfer from the location of release to the general public through tidal movements and ingestion by fish and crustaceans. The amount of purification media release was assumed to contain 2 curies of cobalt-60 and the proportional amounts of other radioactive elements expected to be present with the cobalt-60 in this material. These assumptions are conservative since this operation would only be performed once and may be performed in a dry dock rather than pier-side. In addition, there will be significant engineering of the discharge set up to ensure that no purification media is released to the environment. If conducted pier-side, the discharge operation would be conducted in verbatim compliance to detailed written operating procedures under the oversight of management and safety organizations. Engineered safety features would include containment of the transfer hose to ensure any leakage is captured and controlled and prevented from entering the environment. This accident assumes that all of the engineered precautions fail and the material in transit is discharged into the surrounding water and not back into the ship or the shipping cask.

This section summarizes the detailed pathways analyses described in detail in Appendix D, which determined the radiological impact of a release of radiological purification media during transfer from an MTS. Table 3.11-5 presents the estimated risk of cancer to the general population and individuals due to radiological releases resulting from a release of radioactive purification media. The risks presented in this section result from conservative assumptions and analyses. The risk from a purification media spill is less than a fire and is also considered low when compared to other risks. Additional cancers are not expected in the general public. The average annual individual risk of cancer to the general public living within a 50 mile radius of NPTU Charleston is very low, less than 1 chance in 360 billion.

Table 3.11-5 Summary of Radioactive Purification Media Results

Location	Total Radiation Exposure to Affected Population from a Spill[1]	Annual Risk of Single Cancer in Entire Affected Population from a Spill[2]	Population Estimate Within 50 Miles of NPTU Charleston[3]	Average Annual Risk of Cancer to a Member of the General Population from a Spill[4]	Individual Annual Risk of Cancer for a Maximally Exposed Off-Site Individual from a Spill[5]	An Individual's Annual Risk of Dying from all Cancers[6]
NPTU Charleston	33 person -rem	1 in 550,000 (1.8×10^{-6})	648,975	1 in 360 billion (2.8×10^{-12})	1 in 170 billion (6.0×10^{-12})	1 in 193 (5.2×10^{-3})

Notes:
1. This is the total exposure to general population within a 50-mile radius of the facility due to a spill (person rem).
2. Annual risk of a single cancer in affected population within a 50-mile radius of the facility from radiation exposure due to a spill is calculated by multiplying the total radiation exposure to affected population (rem) by 0.00055 cancers estimated to be caused by each rem (risk/rem; see Table D-3 in Appendix D) by a 1 in 10,000 (0.0001) probability of a spill.
3. This is the estimated number of people within a 50-mile radius of the facility from census data in Table D-4 in Appendix D.
4. Average annual risk of cancer for an average individual within a 50-mile radius of the facility from radiation exposure due to a spill is calculated by dividing the total population cancer risk by the number of people within a 50- mile radius of NPTU Charleston. Risk of cancer is noted in parentheses.
5. The MOI is a theoretical individual living at the base boundary receiving maximum exposure. Risk is calculated by multiplying the total radiation exposure to the MOI (rem; see Table D-15 of Appendix D) by 0.00055 cancers estimated to be caused by each rem (risk/rem; see Table D-3 in Appendix D) by a 1 in 10,000 (0.0001) probability of a spill.
6. This is the annual risk of an individual dying from all sources of cancer. Risk of cancer is noted in parentheses.

Radioactive Liquid Spill

The accident with the third highest risk is a spill of radioactive liquid from a collection facility into surrounding waters. The released radioactivity is evaluated for transfer from the location of release to the general public through tidal movements, ingestion by fish and crustaceans. The amount of water release was assumed to contain 1 curie of cobalt-60 and the proportional amounts of other radioactive elements expected to be present with cobalt-60. These assumptions are conservative since it would require a spill of over 3 million gallons of radioactive liquid (discharged primary coolant) at levels normally contained in collection facilities. The total capacity to store radioactive liquid at the NPTU Charleston radiological support facility is less than 22,000 gallons.

This section summarizes the detailed pathways analyses performed in Appendix D, which determined the radiological impact of a release of radiological liquid from the support facility. Table 3.11-6 presents the estimated risk of cancer to the general population and individuals due to radiological releases resulting from a release of radiological liquid from the support facility. The risks presented in this section result from extremely conservative assumptions and analyses. The risk from a spill is less than a fire and is also considered low when compared to other risks. Additional cancers are not expected in the general public. The average annual individual risk of cancer to the general public living within a 50-mile radius of NPTU Charleston is very low, less than 1 chance in 490 billion.

Table 3.11-6 Summary of Radiological Support Facility Release of Radioactive Liquid Results

Location	Total Radiation Exposure to Affected Population from a Spill[1]	Annual Risk of Single Cancer in Entire Affected Population from a Spill[2]	Population Estimate Within 50 Miles of NPTU Charleston[3]	Average Annual Risk of Cancer to a Member of the General Population from a Spill[4]	Individual Annual Risk of Cancer for a Maximally Exposed Off-Site Individual from a Spill[5]	An Individual's Annual Risk of Dying from all Cancers[6]
NPTU Charleston	24 person -rem	1 in 750,000 (1.3×10^{-6})	648,975	1 in 490 billion (2.1×10^{-12})	1 in 250 billion (3.9×10^{-12})	1 in 193 (5.2×10^{-3})

Notes

1. This is the total exposure to general population within a 50-mile radius of the facility due to a spill (person-rem).
2. Annual risk of a single cancer in affected population within a 50-mile radius of the facility from radiation exposure due to a spill is calculated by multiplying the total radiation exposure to affected population (rem) by 0.00055 cancers estimated to be caused by each rem (risk/rem; see Table D-3 in Appendix D) by a 1 in 10,000 (0.0001) probability of a spill.
3. This is the estimated number of people within a 50-mile radius of the facility from census data in Table D-4 in Appendix D.
4. Average annual risk of cancer for an average individual within a 50-mile radius of the facility from radiation exposure due to a spill is calculated by dividing the total population cancer risk by the number of people within a 50- mile radius of NPTU Charleston. Risk of cancer is noted in parentheses.
5. The MOI is a theoretical individual living at the base boundary receiving maximum exposure. Risk is calculated by multiplying the total radiation exposure to the MOI (rem; see Table D-11 of Appendix D) by 0.00055 cancers estimated to be caused by each rem (risk/rem; see Table D-3 in Appendix D) by a 1 in 10,000 (0.0001) probability of a spill.
6. This is the annual risk of an individual dying from all sources of cancer. Risk of cancer is noted in parentheses.

3.11.7.1.3 Other Potential Facility Accident

Tornado

If a tornado struck in the vicinity of NPTU Charleston, power lines could be blown down causing a loss of shore power resulting in the MTS emergency diesel generators taking over running electrical loads. Alternate power supply lines are being added to reduce the probability that all shore power would be lost as a result of a tornado. Tornado-borne missiles could cause damage to support facilities, but would not penetrate a MTS hull or damage vital in-hull equipment. The consequences of damage from tornado-borne missiles to process piping that would be located on the pier would be less than the spill accident evaluated above. Since tornado-borne missiles would not cause damage to any MTS reactor plant, the reactor plant will not contribute any significant environmental consequences.

Hurricane

Including Hurricane Hugo which struck the Charleston area on September 21, 1989, the area around Charleston South Carolina has experienced 62 hurricanes in 159 years, an average of one every 2.6 years. During Hugo wind speeds were estimated at 135 miles per hour (mph) in Bulls Bay north of Charleston while wind gusts to 137 mph were recorded at the Charleston Naval Station; a storm tide of up to 20 ft inundated coastal sections from around Charleston northward to Myrtle Beach. These conditions describe a Category 4 hurricane on the Saffir-Simpson hurricane scale, with damage categorized as "extreme." The National Oceanic and Atmospheric Administration (NOAA) categorized Hurricane Hugo as a Category 4 hurricane when it struck Charleston (NOAA 1990). Calculations by NOAA indicate that the range of wind speeds for a Probable Maximum Hurricane affecting the Charleston area would be between 152 and 159 mph.

Surge due to a hurricane is a common occurrence in the Charleston area. A 1984 study examined the effect of hurricanes attacking the South Carolina coast. Using a computer model accounting for inland flooding, computations were made for approximately 40 hypothetical hurricanes. The hypothetical hurricane which caused the maximum inundation was a Saffir-Simpson Category 5 hurricane with a 20-mile radius, reaching landfall 20 miles to the south of Charleston Harbor. The maximum wind speed reached was 147 mph.

The 1984 study indicated that the maximum water level at NPTU Charleston would rise to 11.3 ft above Mean Sea Level (MSL). Added to this would be a maximum coincident shallow water wind wave height of 3.4 ft. Coupled with a maximum high tide of 4.1 ft, the result would be a maximum water level of 18.8 ft above MSL or 21.2 ft above Mean Low Water.

The MTS's moorings are designed to securely moor the MTSs for maximum probable hurricane conditions of wind and tidal surge, water level and current. Therefore, the probable effects of the hurricane would be limited to possible damage to power lines and substations resulting loss of shore power. The MTS diesel-powered generators would take over running electrical loads. Alternate power supply lines are being added to reduce the probability that all shore power would be lost as a result of a hurricane. In addition, since hurricanes, unlike tornadoes, provide ample warning of their approach, the possibility of damage would be further minimized because actions to prepare for the hurricane would be taken well in advance of the hurricane's approach. There was no damage to the MTS 635 during Hurricane Hugo.

Upstream Dam Failure

The Pinopolis Dam is a hydroelectric dam and navigation lock on the Cooper River located upstream of NPTU Charleston. The Pinopolis Dam forms Lake Moultrie. A canal and hydroelectric dam also extend from Lake Moultrie to the Santee River to redirect about 80 percent of the Cooper River flow to the Santee River. The average daily flow in the Cooper River is approximately 4,500 cubic ft per second.

Failure of the Pinopolis Dam is estimated to result in a maximum water level at NPTU Charleston of 15 ft above MSL at high tide, occurring about 60 hours after the dam failure. At a 2-year maximum wind speed of 50 mph, the maximum coincident wind wave height would be 2.3 ft, resulting in a maximum water level of 17.3 ft above MSL or 19.7 ft above mean low water. The Pinopolis Dam is located about 34 miles upstream of the NPTU Charleston, and for much of this distance the Cooper River is bordered by wetlands. These wetlands would allow the water from Lake Moultrie to spread out over a much wider area than the river bed, thereby diminishing both the speed and the height of the flood.

Effects of the failure of the Pinopolis Dam on the MTSs; therefore, are expected to be less severe than those of a hurricane. Since the MTS moorings are designed to safely moor the submarine for the maximum probable hurricane condition, no adverse environmental impacts are expected from the MTSs due to a failure of the Pinopolis Dam.

Earthquake

The direct effects of an earthquake on the MTS submarines would be the potential loss of off-hull support facilities and shore power. The systems that are important to ship safety are operable independent of off-hull support and shore power. Since the MTSs are waterborne, any seismic shock would be less severe than the underwater shock and vibration requirements of the submarine design.

Indirect effects of an earthquake could potentially increase or decrease the water level of the Cooper River; however, an increase would be similar to the effect of a flood which would be accommodated by the mooring arrangements. A decrease in river level would be compensated for by inward flow from the Atlantic Ocean. The earthquake might also cause failure of the Pinopolis Dam.

Explosion Accident at Adjacent Activities

An explosion of ammunition could occur while handling operations are being conducted outside of NPTU Charleston on the JB CHS-W. While such an explosion would be very unlikely, the effects on the MTSs and NPTU facilities are assessed.

The location of the MTS submarines at the expanded X-Ray North and X-Ray South piers is sufficiently far away from the places where explosives are handled that the shock effect of an explosion at any of those places would be to give a shock to the submarines that is much less than that which they have been designed to withstand.

The on-shore radiological facilities are housed inside buildings that are designed to withstand the shock effect of an explosion.

3.11.7.1.4 Accident Response

Although the risk of a radiological accident of significant consequence is small, emergency plans are in place at NPTU Charleston to mitigate the impacts of an accident. These plans include activation of emergency control organizations throughout the NNPP to provide on-scene response as well as support for the on-scene response team. Realistic training exercises are conducted periodically to ensure that the response organizations maintain a high level of readiness and to ensure that coordination and communication lines with local authorities and other federal and state agencies are effective. Emergency response measures include provisions for immediate response to any emergency at any NNPP site, identification of the accident conditions, and communication with civil authorities providing radiological data and recommendations for any appropriate protective action. In the event of an accident involving radioactive or mixed-waste materials, workers in the vicinity of the accident would promptly seek shelter to minimize exposure and aid in emergency response consistent with the site's emergency plan for responding to fires and hazardous material incidents. This typically occurs within minutes of the accident and reduces the hazard to workers.

While the NNPP would recommend appropriate actions to protect the public if needed based on Federal guidance (USEPA 400-R-92-001), State and local officials would be responsible for determining and implementing protective actions for the general public outside of JB CHS-W. In the highly unlikely event of an accident there will be insignificant impacts to the public because any impacts from the accident would be localized and not severe. As such the need for the State and local officials to take protective actions is extremely low. However, in the highly unlikely event that some action were necessary, existing civil emergency response plans in place for handling industrial and natural events (for example, chemical spills or hurricanes) are more than sufficient to protect the public in response to a radiological emergency originating from the NPTU Charleston.

3.11.7.2 Impact on Specific Populations

3.11.7.2.1 Impact on Workers

The impact to workers involved in radiological support facility operations due to the postulated radiological accidents has been evaluated. This evaluation focused on the radiological consequences of the fire accident. It is not likely that any adverse impact to the health of nearby workers would occur due to the radiological consequences of this fire accident. The involved workers are expected to move to a position upwind of the fire, put on breathing apparatus, or evacuate the area in accordance with emergency procedures and training.

For the radioactive liquid and purification media spill accidents, the water would drain from the tank or hose and rapidly enter the water pathway. In addition, wet spills result in very small amounts of airborne activity. It is not likely that any adverse impact to the health of nearby workers would occur due to radiological consequences of these spill accidents.

3.11.7.2.2 Impact On Environmental Justice in Children, Minority, and Low Income Populations

As discussed in the preceding sections, the impacts on human health or the environment resulting from normal operations associated with NPTU Charleston radiological support facility operations for MTSs would be small. For example, it is unlikely that a single additional fatal cancer would occur as a result of these activities. Since the potential impacts due to normal operations or accident conditions present no significant risk and do not constitute a credible adverse impact on the surrounding population, no adverse effects would be expected for any particular segment of the population, children, minorities, and low-income groups included.

The conclusion that there would be no disproportionately high and adverse impacts on human health or the environment is not affected by the prevailing winds or direction of surface and subsurface water flow. This is true for normal operations because the effects of routine operations are so small. It is also true for accident conditions because the consequences of any accident would depend on the conditions at the time it occurred and the wind directions do not display any strongly dominant directions. Similarly, the conclusion is not affected by concerns related to subsistence consumption of fish and game since the site is not located in areas that serve as a major source of food for any specific group.

To place the impacts on environmental justice in perspective, the risk would be less than one additional cancer per year for the entire population from MTS support operations. Even if all of the additional impacts were assumed to occur solely among minorities and low income populations, no additional cancers are expected to occur in the population from MTS support operations. Thus, the cancer risk would not constitute disproportionately high and adverse impacts on human health or the environment.

3.11.8 Summary

The NNPP provides comprehensive technical management of all aspects of naval nuclear propulsion plant design, construction, and operation including careful consideration of reactor safety, radiological, environmental and emergency planning concerns. The record of the NNPP's environmental and radiological performance at the operating bases and shipyards presently used by nuclear-powered warships demonstrates the continued effectiveness of this management philosophy. This effectiveness is demonstrated by the fact that through the entire history of the Program–over 6,300 reactor years of operation and more than 145 million miles steamed on nuclear power–there has never been a reactor accident, nor any release of radioactivity that has had an adverse effect on human health or the quality of the environment.

3.12 SUMMARY OF IMPACTS

Table 3.12-1 on the following pages provides a summary of the resources impacted by alternatives; if there were no impacts then the resource is not listed.

Table 3.12-1 Summary of Environmental Impacts by Alternative

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	No Action Alternative
Land Use and Coastal Zone Management	• 18 acres of land development consistent with Base Master Plan • Consistent with SCCZMA to maximum extent practicable	• 16 acres of land development consistent with Base Master Plan • Consistent with SCCZMA to maximum extent practical	• Same as Alternative 1	• Same as Alternative 2	• Same as Alternative 1	• Baseline conditions
Geology, Topography, Seismology, and Soils	• No impact to geology • Topography fill • No increased seismic risk • Temporary erodible soil exposure	• Same as Alternative 1 with less fill and soil exposure	• Same as Alternative 1	• Same as Alternative 2	• Same as Alternative 1	• No changes or impacts
Biological Resource – Terrestrial, Aquatic, and Threatened and Endangered (T&E) Species	• Some land habitat loss and wildlife relocation • Temporary aquatic habitat impact • Temporary T&E impact (M)* • Reduced shading • Construction and dredging habitat loss	• Same as Alternative 1 with less habitat loss and wildlife movement	• Same as Alternative 1 • Less reduction in shading • More construction dredging	• Same as Alternative 2 • Less reduction in shading • More construction dredging	• Same As Alternative 1 • Least reduction in shading	• No changes or impacts
Water Resources – Wetlands, Floodplains, Surface/Stormwater, Groundwater, and Water Quality	• 7.0 acres wetlands loss (M) • 18 acres floodzone impact (M) • Temporary construction and dredging impacts to surface, storm, and water quality impacts (M) • No groundwater impacts • 0.097°F thermal increase	• 6.0 acres Wetlands loss (M). • 16 acres floodzone impact (M) • Balance same As Alternative 1	• Same as Alternative 1 • More dredging impacts on water quality	• Same as Alternative 2 • More dredging impacts on water quality	• Same as Alternative 1	• 0.097°F thermal increase
Transportation	• Land-Service level F potentially worsened, Mitigate via shifts • Navigation-Temporary construction impact (M) • Permanent- small added channel encroachment parallel to shoreline	• Same as Alternative 1	• Same as Alternative 1 with larger channel encroachment parallel to shoreline	• Same as Alternative 3	• Same as Alternative 1	• Same as Alternative 1 • No change in channel encroachment

Table 3.12-1 Summary of Environmental Impacts by Alternative

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	No Action Alternative
Public Health and Safety	• Increase risk of cancer risk due to MTS operation is very low	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1
Air Quality	• Small increase in air emissions during construction • Small increase from emergency generators during transition with reduced air emissions long term	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• No construction impacts • Small reduction in long term air emissions

*(M) = Mitigated

4.0 CUMULATIVE EFFECTS

CHAPTER FOUR: CUMULATIVE EFFECTS

This section provides: 1) a definition of cumulative effects, 2) a description of past, present, and reasonably foreseeable actions relevant to cumulative effects, 3) an analysis of the incremental interaction the Proposed Action may have with other actions, and 4) an evaluation of cumulative effects potentially resulting from these interactions.

4.1 DEFINITION OF CUMULATIVE EFFECTS

CEQ regulations stipulate that the cumulative effects analysis within an EA 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 CFR 1508.7). CEQ guidance in Considering Cumulative Effects affirms this requirement (CEQ 2005), stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with the Proposed Action. The scope must consider geographic and temporal overlaps among the Proposed Action and other actions. It must also evaluate the nature of interactions among these actions.

Cumulative effects are most likely to arise when a relationship or synergism exists between a Proposed Action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in close proximity to the Proposed Action would be expected to have more potential for a relationship than those more geographically separated. Similarly, actions that coincide, even partially, in time would tend to offer a higher potential for cumulative effects.

To identify cumulative effects the analysis needs to address three fundamental questions:

1. Does a relationship exist such that affected resource areas of the Proposed Action might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
2. If one or more of the affected resource areas of the Proposed Action and another action could be expected to interact, would the Proposed Action affect or be affected by impacts of the other action?
3. If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the Proposed Action is considered alone?

4.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this EA, the ROI defines the geographic extent of the cumulative effects analysis; the ROI for this action is the NPTU Charleston proposed development area (refer to Figure 2-1), areas immediately adjacent to it, and the BCD Region identified in Section 3.6. The time frame for cumulative effects starts in 1990 and ends in 2022. This time frame was defined by the 1990 addition of an MTS at NPTU Charleston; interim temporary actions such as trailers for office space, mooring for IX-516, minor parking expansion, and peak student and staff loading; through completion of the construction activities associated with the Proposed Action.

Another factor influencing the scope of cumulative effects analysis involves identifying other actions to consider. Beyond determining that the geographic scope and time frame for the actions interrelate to the Proposed Action, the analysis employs the measure of “reasonably foreseeable” to include or exclude other actions. For the purposes of this analysis, public documents prepared by federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. References used to identify other actions in the ROI included notices of intent to prepare EISs and EAs; local, state, and federal management and land use plans; as well as other publically available documents.

4.3 PAST, PRESENT, AND RESONABLY FORESEEABLE ACTIONS

A thorough search for relevant related actions within the ROI was performed. After a review of past, present, and foreseeable actions, it was determined that two past actions would be considered for potential cumulative impacts. Below are brief descriptions of these actions.

4.3.1 Past Actions

NPTU Charleston must meet the Fleet’s demand for highly trained, competent nuclear reactor officers and operators to ensure the fleet can perform its mission. As such, demand for training fluctuates based on need and the number of nuclear-powered vessels in the U.S. Navy at any given time. NPTU must also ensure that this training is carried out in a safe and secure manner. Described below are two past actions at NPTU Charleston that required NEPA documentation.

Environmental Assessment for Propulsion Training Facility, Naval Weapons Station Charleston, Berkeley County, South Carolina. An EA was completed and a FONSI signed in 1990. The EA evaluated the impacts of expanding the NPTU facility by the addition of a second MTS, modification of pier X-Ray to accommodate the MTS, construction of a 68,000 sf administration/classroom building, and 5,400 sf of radiological work area. Construction and modification of access roads was also analyzed as part of the Proposed Action.

Environmental Assessment for Security Improvements at Pier X-Ray, Naval Weapons Station Charleston, South Carolina. An EA was completed and a FONSI signed in January 2003 to implement security improvements to protect training facilities at Pier X-Ray. The preferred alternative was a waterfront boat barrier that provides a means of constant waterside security for the two MTSs and the IX-516 support barge. In order to ease navigational concerns expressed by local maritime interests, the Navy proposed to widen a portion of the navigational channel north of Pier X-Ray by dredging.

4.3.2 Present and Reasonably Foreseeable Actions

In accordance with CEQ’s guidance, reasonably foreseeable actions focus on those that are relevant and useful in analyzing whether there is a possible incremental impact when considered with the Proposed Action.

4.3.2.1 Potential Actions at NPTU Charleston

There are currently several construction projects planned (though not necessarily funded) on JB CHS-W that could possibly contribute cumulative impacts to the human or natural environment. These include: gate improvements at Redbank Rd. Gate 1 and Ordnance Gate 2; construction of the Army Helicopter Breakdown Building, Fire Station, and Fitness Center; as well as an Exchange Student Store.

4.3.2.2 Potential Actions in the Surrounding Area

Berkeley County is in the process of updating its Comprehensive Plan and has released a Draft version that includes a future land use map. Though the plan is out for public comment and subject to change, the Draft Comprehensive Plan shows the area surrounding NPTU Charleston as being within the Growth Allocation Area, or an area that the County has decided would be beneficial to target for future growth potential. The areas around NPTU Charleston are considered Low Density Residential, with Conservation/Recreation areas to the north and Industrial/Employment Centers to the northeast across the Cooper River. It is worth noting that the off-base portion of Redbank Rd is considered a Commercial Corridor and could be targeted for future growth (Berkeley County 2011). A two-phase roadway project was identified in the CHATS Transportation Improvement Plan that is proposed for funding between FY10 and FY15. The first phase of the project involves a capacity widening of Henry Brown Blvd from Liberty Hall Rd to Redbank Rd. The second phase would extend Henry Brown Blvd north from its current terminus, cross Medway/Pine Grove Rd and tie into U.S. 52 approximately 0.5 mi north of the intersection of U.S. 52 and Medway/Pine Grove Rd (BCDCOG 2009).

Maintenance dredging by USACE in the Cooper River is done on an annual basis and would have the potential to interact with activities at NPTU Charleston; however, all of the proposed dredging activities at NPTU Charleston would be done within the already permitted area and be within the limits already established by the permit.

No other actions in the BCD Region would interact with this Proposed Action to cause cumulative effects.

4.4 CUMLATIVE EFFECTS SUMMARY

As explained in Chapter 3, implementation of the Proposed Action would not have significant adverse effects on cultural and traditional resources, air quality, visual and recreational resources, environmental justice, protection of children, human noise, and global climate change. As such, these resources were not carried forward into the cumulative impacts analysis. The following resources were evaluated for cumulative effects: land use and coastal zone management; geology, topography, seismology, and soils; biological resources; water resources; socioeconomics; transportation; public health and safety; toxic substances, hazardous materials, and waste; and infrastructure and utilities.

4.4.1 Land Use and Coastal Zone Management

None of the action alternatives when considered along with other actions in the ROI would present significant land use changes. While some land use designations would move from undeveloped to developed, the expanded land use is consistent with or would be substantially similar to existing and past use of land in the area. Similarly, the proposed action and alternatives would be implemented in a manner consistent, to the maximum extent practicable, with South Carolina's coastal zone management policies. No other past, present, or foreseeable actions in the ROI would interact with the action alternatives; therefore, no cumulative impacts are anticipated to South Carolina’s coastal zone.

4.4.2 Geology, Topography, Seismology, and Soils

No cumulative impacts to geology, topography, or seismic characteristics would be caused by implementation of any of the action alternatives when considered cumulatively with other actions in the ROI. The action alternatives would have temporary impacts to soils due to disturbance from construction. However, with the use of standard BMPs (refer to Section 3.3.2) for prevention erosion and sedimentation, impacts to soils would be negligible and short term. Other actions in the ROI could contribute cumulatively to the action alternative impacts, however, not to an extent to adversely affect geology, topography, seismology, and soils.

4.4.3 Biological Resources

Under any of the action alternatives, up to 8 acres of forested land would be removed for parking area construction. However, existing forested land both on JB CHS-W, and in the ROI, would not constitute adverse cumulative, measurable impact to forest resources or the habitat it presents to wildlife. Additionally, as part of Berkeley Counties Comprehensive Plan (Berkeley County 2010), there are areas immediately surrounding JB CHS-W boundary that are zoned as Conservation/Recreation and would be protected from development (Berkeley County 2011). It is unlikely that there would be any significant cumulative impacts to wildlife in the vicinity of NPTU Charleston as most construction (both with the Proposed Action and reasonably foreseeable action on JB CHS-W) takes place on previously disturbed ground. The Navy Integrated Natural Resource Management program is in place and all management directives (e.g., updating rare, threatened, and endangered plant and animal species surveys annually and monitoring the health and size of wildlife populations) found within that program would be followed to preclude long-term adverse impacts to wildlife. Marine wildlife could be disturbed; however, it is anticipated that in conjunction with the Marine Mammal Observation Plan, that these mobile species would avoid the area during construction periods or in-water construction activities would be halted during their presence within prescribed distances. No other aquatic-based construction would occur under reasonably foreseeable projects at JB CHS-W. In the vicinity of NPTU Charleston, the Cooper River is also routinely dredged to allow passage of large ships which creates a disturbed marine environment. Incorporating the mitigation measures described in Chapter 5, all impacts are expected to be minor and local; therefore, no impacts to species abundance or stability of the population for any wildlife, terrestrial, or marine species are anticipated. Therefore, no adverse cumulative impacts to wildlife or threatened and endangered species or their associated habitat are anticipated.

4.4.4 Water Resources

The action alternatives would have impacts on wetlands and floodplains. Up to 7 acres of wetlands would be removed and a total of 18 acres of new development would occur within the 100-year floodplain. These impacts would be combined with the past loss in 1990 of about 2 acres of wetlands from the original NPTU facility construction; however, the 2 acres were offset by creating 2 acres on JB CHS-W. Similarly, wetland impacts from any of the action alternatives would be minimized, mitigated, or offset per USACE permit requirements and instructions. No other actions in the ROI were identified to interact cumulatively on wetlands.

As described in Section 3.11.5, thermal emissions from the MTSs, including during the transition period when three MTSs could be in simultaneous operation, would be well mixed and less that 0.097 degree F. This would be well below SCDHEC limits. Due to the small temperature change, no cumulative impacts are expected. Actual temperature change is expected to be less since MTSs infrequently operate at maximum power levels.

Construction within the 100-year floodplain cannot be avoided because the support facilities must be co-located with the MTSs. Through the use of LID techniques and BMPs (refer to Section 3.5) for dealing with stormwater runoff long-term impacts from the Proposed Action and past actions are unlikely. All required permitting and associated mitigation prescribed by state, federal, and local regulations would be met to remain consistent with South Carolina's Coastal Zone Management Program. No other actions within the ROI would affect the 100-year floodplain when considered cumulatively.

4.4.5 Socioeconomics

All of the action alternatives, when considered with other actions in JB CHS-W would cause both short- and long-term positive input to the local economy. Short-term positive impacts would be generated from construction activities, while long-term inputs would come from permanent employment of necessary staff to accommodate the end state student loading at NPTU. Other actions outside JB CHS-W, such as the economic downturn, could affect the regional economy but the added stimulus of students and staff would be seen as a positive input to the ROI. The housing market is more than able to absorb both the Proposed Action increase in students and staff as well as any other development that could occur in the BCD Region. Therefore, no adverse cumulative socioeconomic impacts are anticipated.

4.4.6 Transportation

The action alternatives and other JB CHS-W projects could cause a slight, though imperceptible increase in ground based traffic due to the increase in student loading that will peak during FY20 to FY22. Traffic is already heavy around the Installation but because students and staff can use any of the entry gates to access NPTU, it is unlikely that any traffic impacts would be noticed. It is anticipated that improvements at Gate 1 at Redbank Rd could alleviate congestion during peak commuting hours. Outside of JB CHS-W, future development in the Commercial Corridor along Redbank Rd could exacerbate any of the current traffic concerns that surround the installation (Berkeley County 2011). Capacity increase and extension of Henry Brown Blvd is planned, but not yet funded (Berkeley County 2011). Any projects that increase roadway capacity would help to counter act any ground traffic increases caused by the action alternatives. Further long-range development planning would likely include upgrades to transportation corridors that would also alleviate traffic congestion.

No aspects of the Proposed Action or reasonably foreseeable projects on JB CHS-W are anticipated to impact marine vessel traffic in the Cooper River in the vicinity of Piers X-Ray North and South. During pier construction, efforts (such as notices to mariners) would be made to ensure that marine vessels could pass through the area with minimal delay. Because the pier construction would occur parallel to the federal navigation channel, encroachment would not be an issue. Currently, there are no ongoing projects or foreseeable plans that would increase marine vessel traffic past the NPTU piers. As such, there would be no adverse cumulative impact to ground or marine traffic.

4.4.7 Public Health and Safety

No aspects of any of the Proposed Action or reasonably foreseeable projects on JB CHS-W would create a situation that increased the risk to public health and safety. Construction activities would occur entirely within the boundaries of JB CHS-W and the general public would not be exposed conditions related to construction activities. During construction activities all OSHA regulations and guidelines for workplace safety would be met. Construction activities at NPTU would also not introduce any kind of unique safety risk.

4.4.8 Hazardous and Toxic Materials and Waste

No aspects of the Proposed Action would result in additional hazardous and toxic materials or waste to be generated or stored at NPTU Charleston; therefore, there should not be any adverse cumulative impacts when considered along with reasonably foreseeable projects on JB CHS-W. No aspects of past actions or foreseeable future actions outside of JB CHS-W that would lead to long-term impacts from hazardous and toxic materials and waste.

4.4.9 Infrastructure and Utilities

The Proposed Action, along with reasonably foreseeable actions on JB CHS-W, would not cause capacity concerns with respect to infrastructure and utilities. While electrical capacity would be increased and include alternate power supply lines would be added; however,, there is adequate capacity to provide this growth in power needs. In addition, there is adequate capacity from local suppliers to support the increased need for potable water, wastewater, and solid waste generation anticipated from JB CHS-W. The increase in NPTU Charleston student loading and staff would not represent a large enough proportion of the population to cause any adverse impacts to public services, schools, or hospitals. No other actions on JB CHS-W or in the surrounding area would create cumulative, adverse infrastructure or utility concerns.

5.0 MITIGATION MEASURES

CHAPTER FIVE: MITIGATION MEASURES

These mitigation measures were prepared pursuant to 32 CFR 989.22(d) and Chief of Naval Operations Instruction (OPNAVINST) 5090.1C change 1 (5-1.10.5) and were identified through examination of applicable Navy, Air Force, and regulatory requirements and guidance, consultation with the U.S. Army Corps of Engineers (USACE), Charleston District; National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) Protected Resource Division (PRD) and Habitat Conservation Division (HCD); U.S. Fish and Wildlife Service (USFWS); South Carolina Department of Health and Environmental Control (SC DHEC) and SC DHEC Office of Coastal Resource Management (SC DHEC OCRM); and South Carolina State Historic Preservation Office (SC SHPO).

Coastal Zone Management. Construction impacts will be mitigated through the use of Best Management Practices (BMPs) as outlined in the EA and by the SC DHEC OCRM BMP Handbook.

Soils. Construction impacts will be mitigated through the use of BMPs as outlined in the EA and by those outlined in the SC DHEC OCRM BMP Handbook.

Water Resources (Wetlands and Waters of the U.S.). Once designs are finalized and through the permitting process with the USACE, the Navy will purchase credits from a wetlands bank, currently estimated as 10 wetland credits for each acre impacted and expected to be no more than 7 wetland acres or about 70 credits. Wetland credits will be purchased by the Navy from a USACE-approved wetland mitigation bank. Pigeon Pond has been identified as a mitigation bank that has available credits for purchase.

Water quality mitigations will involve the use of standard BMPs for final design and construction and the adherence to all applicable federal, state, and local laws requiring water quality and erosion and sediment control in South Carolina. All BMPs and construction practices will follow those procedures outlined in SC DHEC OCRM's BMP Handbook.

Biological Resources (threatened and endangered species and essential fish habitat). The Navy determined that no takes to marine mammals are likely when the Marine Mammal Observer Plan (Plan) is implemented during in-water work (the Marine Mammal Observer Plan is provided in Appendix G). This Plan outlines the procedures for monitoring and reporting activities in the project area during pile driving activities. Per consultation with NMFS, the Navy will: not conduct in-water work in the Cooper River between October 1 and March 30; undertake noise ramp-up procedures prior to pile-driving activities; not drive piles prior to May 1; and only drive steel piles between June 15 and August 30 (see Appendix A, Draft Environmental Assessment Responses, NMFS August 31, 2012 letter).

Impacts to West Indian manatees from construction activities will be mitigated through application of Standard Manatee Guidelines provided by the USFWS (see Appendix A, Draft EA Responses [attachment to USFWS March 20, 2012 letter]). While sea turtles and smalltooth sawfish are not found in the project area, adherence to NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions will mitigate potential adverse impacts to these species if they were to occur (see Appendix A, Draft EA Responses [attachment to NMFS March 8, 2012 letter]). Trained marine mammal observers for manatees and bottlenose dolphin, as well as sea turtles and smalltooth sawfish will be present during in-water construction so that pile driving and dredge activities do not adversely affect these species. Guidelines for the trained marine mammal observers are provided in Appendix G.

The Navy has determined that the action alternatives may affect, but are not likely to adversely affect the shortnose and Atlantic sturgeon, with implementation of the NPTU Charleston Facilities Expansion Mitigation Plan and Marine Mammal Observation Plan. The NMFS concurred with this finding on August 31, 2012 (see Appendix A, Draft Environmental Assessment Responses, NMFS August 31, 2012 letter). To mitigate potential impacts to Atlantic and shortnose sturgeons as well as to essential fish habitat, the Navy will follow NMFS recommendations to not conduct in-water work in the Cooper River between October 1 and March 30. In addition, prior to pile-driving activities, noise ramp-up procedures will be followed. No piles may be driven prior to May 1 and steel piles may only be driven between June 15 and August 30 (see Appendix A, Draft Environmental Assessment Responses, NMFS August 31, 2012 letter). The Navy will follow NMFS recommendations to the extent practicable, to not conduct dredging (outside of the routine maintenance dredging) and filling of wetland areas during the fish spawning season and that the security fence design allows for passage of marine organisms through the fencing. Existing permitted maintenance dredging would not change.

In addition, to protect adjacent essential fish habitat, a vegetated buffer of at least 75 feet shall be present between all estuarine emergent marsh and new parking areas and walkways. This will serve to filter stormwater runoff and provide organic material for the food chain.

Transportation/Navigation Traffic. Mitigations for potential impacts to marine traffic using the navigational channel will require the Navy to coordinate with the U.S. Coast Guard any restrictions that might occur due to pier construction on the Cooper River. The Navy will send the Coast Guard a letter of notification for announcement in the Coast Guard’s Notice to Mariners when construction equipment or materials or related activities will be obstructing the navigational channel. During proposed in-water construction, the Navy will work with Amoco Chemicals and Nucor Steel to schedule passage of commercial vessels so as to minimize potential conflicts and delays. To alleviate traffic congestion when there are three operational MTSs, the Navy will stagger student start and leave times to lessen traffic congestion at the base.

Public Safety. Facilities being constructed are within the Explosives Safety Quantity Distance for Inhabited Buildings of Wharf Alpha. This will be mitigated by constructing the inhabited buildings in accordance with OPNAVINST 5530.14C and Air Force Manual (AFM) 91-201, which generally require hardened concrete structures able to withstand an explosive blast based on Wharf Alpha's ordnance. Additionally, Department of Defense Explosives Safety Board (DDESB) through the Air Force Safety Center (AFSC) and Naval Ordnance Safety and Security Activity (NOSSA) will conduct an advanced site plan review, prior to any final designs.

Cultural Resources. If during construction activities a discovery of cultural resources is made, construction activity will cease; the JB CHS cultural resources manager will be notified; and prescribed procedures for protection, as set forth in the Naval Weapons Station Integrated Cultural Resources Management Plan will be followed.

6.0 OTHER NEPA CONSIDERATIONS

CHAPTER SIX: OTHER NEPA CONSIDERATIONS

6.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Implementation of any of the action alternatives would result in the permanent loss of up to 7 acres of wetlands. There would be approximately 18 acres that would be developed within the 100-year floodplain along the Cooper River, 11 of these acres have already been disturbed or are cleared.

6.2 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE HUMAN ENVIRONMENT, AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

NEPA requires analysis of the relationship between a project's short-term impacts on the environment and the effects those impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This means that choosing one option may reduce future flexibility in pursuing other options, or that committing a resource to a certain use may eliminate the possibility for other uses of that resource.

Implementation of any of the action alternatives are not expected to result in impacts that would reduce environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety, or the general welfare of the public.

6.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Primary irreversible effects result from permanent use of a nonrenewable resource (e.g., minerals or energy). Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the Proposed Action or consumption of renewable resources that are not permanently lost. Secondary impacts could result from environmental accidents. Natural resources include minerals, energy, land, water, forestry, and biota. Nonrenewable resources are those resources that cannot be replenished by natural means, including oil, natural gas, and iron ore. Renewable natural resources are those resources that can be replenished by natural means, including water, lumber, and soil. The action alternatives would involve minor commitments of irretrievable non-renewable and renewable resources, the magnitude of which depends on the alternative selected, and could involve negligible amounts of industrial resources such as capital, labor, and fuels.

EO 13423*, Strengthening Federal Environmental, Energy, and Transportation Management*, set goals for federal agencies in areas such as energy efficiency, renewable energy, toxic chemical reduction, recycling, sustainable buildings, electronics stewardship, and water conservation. EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, expands on the requirements set forth in EO 13423 and requires that all new construction comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*. This includes employing design and construction strategies that increase energy efficiency, eliminate solid waste, and reduce stormwater runoff. One strategy for reducing stormwater runoff is the implementation of LID technologies. As it pertains to this Proposed Action, EO 13423 sets as a goal for all federal agencies the improvement of energy efficiency and the "reduction of greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline to the agency's energy use in fiscal year 2003." In October 2009, the Navy announced five energy goals and include:

- New requirements for acquisition processes with mandatory evaluation factors used when awarding contracts for platforms, weapon systems, and buildings that will include lifecycle energy costs, full-burdened fuel costs, and contractor energy footprint.
- Sail the “Great Green Fleet” in which the DoN will demonstrate a Green Strike Group in local operations by 2012 and sail it by 2016 that will include nuclear ships, surface combatants using biofuels with hybrid power systems, and aircraft flying on biofuels.
- Reduce petroleum use in non-tactical vehicles. By 2015 DoN will reduce petroleum use in the commercial fleet by 50 percent by utilizing flex fuel, hybrid electric, and neighborhood electric vehicles.
- Increase alternative energy ashore. By 2020 DoN will produce at least 50 percent of shore-based energy requirements from alternative sources such as wind, solar, ocean, and geothermal.
- Increase alternative energy use Navy-wide. By 2020, 50 percent of total DoN energy consumption will come from alternative sources (Cullom 2009).

While the action alternatives may contribute to the consumption of more nonrenewable resources, the energy required for NPTU training operations are not in short supply; their use would not have an adverse impact on their continued availability, and the energy resource commitment is not anticipated to be excessive in terms of region-wide usage. Furthermore, the Navy’s on-going efforts to comply with the requirements set forth in EO 13423 would assist to minimize any irreversible or irretrievable effects to multiple non-renewable and renewable resources.

7.0 CITED REFERENCES

CHAPTER SEVEN: CITED REFERENCES

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8.0 LIST OF PREPARERS AND CONTRIBUTORS

CHAPTER EIGHT: LIST OF PREPARERS AND CONTRIBUTORS

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M.S., Natural Resources
M.A., International Relations
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M.A., Geography
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M.S., Geography
Years of Experience: 30

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NPTU-Charleston

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M.S.E.S., Mechanical Engineering
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Years of Experience: 31

Jeffery Steele, P.E.
B.A. and M.A., Chemistry
Years of Experience: 33

APPENDIX A

COORDINATION AND CONSULTATION CORRESPONDENCE

MAILING LIST

Group I - Tribes

Salut.	First & Mi.	Last	Title	Organization	City	State	Zip
Governor	Bill	Anoatubby	Governor	The Chickasaw Nation	Ada	OK	74821-1548
Ms.	Virginia	Nail	THPO	The Chickasaw Nation	Ada	OK	74821-1548
Chief	Donald	Rodgers	Chief	Catawba Indian Nation	Rock Hill,	SC	29730
Dr.	Wenonah	Haire	THPO	Catawba Indian Nation	Rock Hill	SC	29730
Ms.	Sandra	Rinehart	THPO	Catawba Indian Nation	Catawba	SC	29704
Chief	George	Wickliffe	Chief	United Keetoowah Band of Cherokee	Tahlequah	OK	74464
Ms.	Lisa	Stopp	THPO	United Keetoowah Band of Cherokee	Tahlequah	OK	74464
Principle Chief	Chad	Smith	Principal Chief	Cherokee Nation of Oklahoma	Tahlequah	OK	74465
Mr.	David	Rabon	THPO	Cherokee Nation of Oklahoma	Tahlequah	OK	74465
Mr.	Richard L.	Allen		Cherokee Nation of Oklahoma	Tahlequah	OK	74465
Principle Chief	A.D.	Ellis	Principal Chief	Muscogee (Creek) Nation	Okmulgee	OK	74447
Mr.	Joyce	Bear	THPO	Muscogee (Creek) Nation	Okmulgee	OK	74447
Governor	Jennifer	Onzahwah	Governor	Absentee-Shawnee Tribe of Oklahoma	Shawnee	OK	74801
Ms.	Jennifer	Makaseah	THPO	Absentee-Shawnee Tribe of Oklahoma	Shawnee	OK	74801
Governor	Bill	Anoatubby	Governor	Chickasaw Nation	Ada	OK	74821
Ms.	Virginia	Nail	THPO	Chickasaw Nation	Ada	OK	74821
Chief	Charles	Enyart	Chief	Eastern Shawnee Tribe of Oklahoma	Seneca	MO	64865

Salut.	First & Mi.	Last	Title	Organization	City	State	Zip
STATE AGENCIES							
Mr.	Joe	Taylor	Director	SC Department of Commerce	Columbia	SC	29201
Ms.	Jennifer	Rice	Engineering Secretary	Berkeley County Water and Sanitation Authority	Moncks Corner	SC	29461
Mr.	James I.	Newsome, III	President & CEO	SC State Ports Authority	Charleston	SC	29413
Mr.	C. Earl	Hunter	Commissioner	SC Department of Health and Environmental Control (SCDHEC)	Columbia	SC	29201
Ms.	Shelly	Wilson	Federal Facilities Liaison, EQC	SC Department of Health and Environmental Control (SCDHEC)	Columbia	SC	29201
Mr.	John	Frampton	Director	SC Department of Natural Resources (SCDNR)	Columbia	SC	29202
			Regional Director	SC Department of Natural Resources-Region 4 Office Charleston	Charleston	SC	29422
Mr.	Les	Bolles	Director	SC State Clearinghouse of Intergovermental Review	Columbia	SC	29201
Ms.	Elizabeth	Johnson	Deputy State Historic Preservation Officer	SC State Historic Preservation Office	Columbia	SC	29223
Mr.	Robert J.	St. Onge, Jr	Transportation Secretary	SC Department of Transportation	Columbia	SC	29202
FEDERAL AGENCIES							
LTC	Edward P.	Chamberlayne	Commander and District Engineer	US Army Corps of Engineers Charleston District	Charleston	SC	29403
Mr.	Larry O.	Gissentanna	DoD and Federal Agency, Project Manager	US Environmental Protection Agency Region IV	Atlanta	GA	30303
Rear Adm.	William D.	Baumgartner	Commander	US Coast Guard District 7 Command Center (FL, GA, SC)	Miami	FL	33131
				US Coast Guard Sector Charleston Command Center	Charleston	SC	29401
Ms.	Cynthia	Dohner	Regional Director	US Fish and Wildlife Services - Region IV	Atlanta	GA	30345
Mr.	Jay B.	Herrington	Field Supervisor	US Fish and Wildlife Service	Charleston	SC	29407
Dr.	Roy	Crabtree	Reginal Administrator	National Marine Fisheries Services	St. Petersburg	FL	33701
Ms.	Jaclyn	Daly	Fisheries Biologist	National Marine Fisheries Services, Charleston Branch Office	Charleston	SC	29422

Group III - Elected Officials

First & Mi.	Last	Title	Organization	City	State	Zip
Federal Elected Officials						
Senator	Lindsey	Graham	U.S. Senate	Washington	DC	20510
Senator	Jim	DeMint	U.S. Senate	Washington	DC	20510
Senator	Lindsey	Graham	U.S. Senate	Mt. Pleasant	SC	29464
Senator	Jim	DeMint	U.S. Senate	Charleston	SC	29401
Congressman	James E.	Clyburn	U.S. House of Representatives	Washington	DC	20515
Congressman	James E.	Clyburn	U.S. House of Representatives	N. Charleston	SC	29405
Congressman	Joe	Wilson	U.S. House of Representatives	Washington	DC	20515
Congressman	Joe	Wilson	U.S. House of Representatives	Beaufort	SC	29902
Congressman	Tim	Scott	U.S. House of Representatives	Washington	DC	20515
Congressman	Tim	Scott	U.S. House of Representatives	Charleston	SC	29407
State Elected Officials						
Governor	Nikki	Haley	South Carolina Governor's Office	Columbia	SC	29201
President Pro Tempor	Glenn	McConnell	State Senator	Columbia	SC	29201
Senator	Robert	Ford	State Senator	Columbia	SC	29201
Senator	George E. "Chip"	Campsen, III	State Senator	Columbia	SC	29201
Representative	Harry B. "Chip"	Limehouse, III	State Representative	Columbia	SC	29201
Speaker	Robert	Harrell, Jr.	State Representative	Columbia	SC	29201
Representative	Peter M.	McCoy, Jr.	State Representative	Columbia	SC	29201
Representative	William E. "Bill"	Crosby	State Representative	Columbia	SC	29201
Representative	C. David	Umphlett, Jr.	State Representative	Columbia	SC	29201
Representative	James H.	Merrill	State Representative	Columbia	SC	29201
Representative	Joseph	Jefferson	State Representative	Columbia	SC	29201
Representative	Joseph	Daning	State Representative	Columbia	SC	29201
Local Elected Officials						
Mayor	R. Keith	Summey	North Charleston Mayor's Office	N. Charleston	SC	29406
Chairman	R. Keith	Summey	Berkeley, Charleston, Dorchester Council of Goverments	N. Charleston	SC	29405
Clerk of Council	Beverly	Craven	Charleston County Council	N. Charleston	SC	29405
Supervisor	Dan W.	Davis	Berkeley County Supervisor	Moncks Corner	SC	29461

Salut.	First & Mi.	Last	Title	Organization	City	State	Zip
Mr.	Norman	Brunswig	State Director	Audubon Society South Carolina	Harleyville	SC	29448
Mr.	Bill	McCall	President	Berkeley Chamber of Commerce	Moncks Corner	SC	29461
Mr.	Mike	Olbrich	General Works Manager	BP Chemical Cooper River Plant	Charleston	SC	29492
Mr.	Paul	Nolan	President	Charleston Audobon Society	Charleston	SC	29402
Ms.	Shannon	Brennen	Executive Director	Charleston Local Development Corporation	Charleston	SC	29401
Mr.	Charles	Van Rysselberge	President	Charleston Metro Chamber of Commerce	North Charleston	SC	29405
Mr.	J.	Cameron	Executive Director	Charleston Pilots Association	Charleston	SC	29401
Mr.	Cyrus	Buffum	Waterkeeper	Charleston Waterkeeper	Charleston	SC	29402
Mr.	Scott	Whitaker	Executive Director	Coastal Conservation Association-SC Chapter	Columbia	SC	29223
Mrs.	Megan	Desrosiers	Associate Director	Coastal Conservation League-Charleston Office	Charleston	SC	29402
Mr.	Kurt	Henning	Chapter Coordinator	Sierra Club, South Carolina Chapter	Columbia	SC	29202
Mr.	Mark	Robertson	Executive Director	South Carolina Nature Conservancy	Columbia	SC	29205
				SC Nature Conservancy-Charleston Office	Charleston	SC	29403
Mr.	David J.	Wielicki	Executive Director	South Carolina Waterfowl Association	Pinewood	SC	29125
Mr.	Ben	Gregg	Executive Director	South Carolina Wildlife Federation	Columbia	SC	29205

SAMPLE SCOPING CORRESPONDENCE

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/0105
June 9, 2011

Lieutenant Colonel Jason A. Kirk
Commander, U.S. Army Corps of Engineers
Charleston District
69A Hagood Avenue
Charleston, SC 29403

Dear Colonel Kirk:

SUBJECT: NATIONAL ENVIRONMENTAL PROTECTION ACT SCOPING AND COORDINATION WITH THE DEPARTMENT OF THE NAVY ENVIRONMENTAL ASSESSMENT FOR INFRASTRUCTURE IMPROVEMENTS AND EXPANSION TO SUPPORT NUCLEAR POWER TRAINING UNIT CHARLESTON OPERATIONS AND TRAINING AT JOINT BASE CHARLESTON, SOUTH CAROLINA

As the lead agency, the Department's of the Navy (Navy) and Air Force, as a cooperating agency, are preparing an Environmental Assessment (EA) to assess the impacts of infrastructure improvements and expansion at Nuclear Power Training Unit-Charleston (NPTU Charleston) on Joint Base Charleston (JB CHS), SC. The Navy and the Air Force are sending this letter requesting scoping comments from interested parties to provide input which will assist the Navy in project planning and analysis, as part of our coordination and consultation responsibilities and to comply with provisions of the National Environmental Policy Act of 1969 (NEPA). Information that you provide will be considered and addressed as appropriate in the EA, which we will make available to you upon request.

NPTU Charleston's mission is to provide prospective naval nuclear propulsion plant operators and officers with training and certification in the actual hands-on operation of a nuclear propulsion plant. The proposed action, purpose, need, and alternatives are discussed in the Description of the Proposed Action and Alternatives attached as enclosure (1). Under the proposed action, the Navy would expand and upgrade NPTU Charleston's academic, administrative, and training facilities to alleviate current overcrowding, accommodate increased student throughput (with an associated increase in NPTU staff), provide facilities for transitioning to newer Moored Training Ships (MTSs), allow for uninterrupted student training during MTS transition, and ensure all facilities meet applicable security requirements.

5090
Ser EV21/0105
June 9, 2011

The EA is being prepared in accordance with the NEPA of 1969 and the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), Chief of Naval Operations Instruction (OPNAVINST) 5090.1C, and Air Force Environmental Impact Analysis Process (32 CFR 989). This EA will evaluate the potential impacts on humans and the natural environment associated with the proposed action and alternatives (including a no action alternative).

We welcome your participation in this NEPA scoping process. In order to ensure all information and concerns are adequately addressed in the preparation of the EA, your response is requested on or before July 31, 2011. A draft of the EA will be made available to you and the public for review and comment.

If you have any questions or concerns, please do not hesitate to contact Mr. Tom Currin, NAVFAC SE (EV21), at: (904) 542-6301 or by e-mail: thomas.currin@navy.mil. Written correspondence can be addressed as follows:

Commanding Officer
Naval Facilities Engineering Command Southeast
Attn: Mr. Tom Currin, NAVFAC SE (EV21)
P.O. Box 30A
Jacksonville, FL 32212-0030

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the Commanding
Officer

Enclosure: Description of Proposed Action and Alternatives

SCOPING RESPONSES

DEPARTMENT OF THE ARMY
CHARLESTON DISTRICT, CORPS OF ENGINEERS
69-A HAGOOD AVENUE
CHARLESTON, SOUTH CAROLINA 29403-5107

REPLY TO
ATTENTION OF

CESAC-RD-SP

JUL 15 2011

MEMORANDUM FOR Commanding Officer, Naval Facilities Command Southeast, Mr. Tom Currin, NAVFAC SE (EV21), Post Office Box 30A, Jacksonville, Florida 32212-0030

SUBJECT: National Environmental Protection Act Scoping and Coordination with the Department of the Navy Environmental Assessment for Infrastructure Improvements and Expansion to support Nuclear Power Training Unit Charleston Operations and Training at Joint Base, Charleston, South Carolina

1. This is in response to a letter dated June 9, 2011, regarding an Environmental Assessment that is being prepared to evaluate potential impacts associated with infrastructure improvements and expansion of the Naval Nuclear Power Training Unit-Charleston (NPTU Charleston). According to the information you have provided, the proposed project will likely include the placement of fill material, modifications to an existing pier, relocation of an existing security barrier, and additional dredging in waters of the U.S. Therefore, a Department of the Army (DA) permit, pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, will be required for the proposed project.

2. Based on a review of our records, Joint Base Charleston obtained a DA permit (SAC-2009-00175) to dredge and maintain depths at Piers X Ray North and X Ray South at NPTU Charleston, and a separate DA permit (SAC-2001-1D-145) to install and maintain a security barrier around the existing piers and vessels. In addition, they obtained a Jurisdictional Determination (SAC-2007-02193) for a portion of the NPTU Charleston site. It is our understanding that you plan to submit a Request for Wetland Determination for the remainder of the project site to this office for our review and approval.

3. All proposed activities that impact navigable or non-navigable waters of the United States should be identified and evaluated in your EA. The Corps would be glad to assist you as a cooperating agency in determining the level of information that will be required to evaluate each of these activities. Incorporating this information into your EA should facilitate our review of Joint Base Charleston's application for a DA permit for the proposed project.

4. Please note this office is aware of an ongoing effort to convert freshwater aquatic resources that are located on or near the project site into a tidal saltwater marsh as part of a compensatory mitigation plan for other development activities at Joint Base Charleston. The proposed mitigation activities may impact the limits of aquatic resources on the project site and/or your ability to offset any unavoidable adverse impacts to these areas in the future.

5. The Corps appreciates this opportunity to review the Description of Proposed Action and Alternatives, dated June 2011, and we look forward to reviewing the draft EA once it has been prepared. If you have any questions about our comments, please do not hesitate to contact our project manager Mr. Nathaniel I. Ball at 843-329-8047.

Edward P. Chamberlayne, P.E.
Lieutenant Colonel, U.S. Army
Commander and District Engineer

Copy Furnished:

Mr. Blair Williams
SCDHEC-OCRM
1362 McMillan Ave, Suite 400
Charleston, South Carolina 29405

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

June 27, 2011

Commanding Officer
Naval Facilities Engineering Command Southeast
P.O. Box 30A
Jacksonville, FL 32212-0030

Attn: Tom Currin

Re: Proposed Improvements to the Nuclear Power Training Unit, Joint Base Charleston, Charleston County, FWS Log No. 2011-CPA-0150

Dear Sir:

The U.S. Fish and Wildlife Service (Service) has reviewed your submitted document for the proposed improvements and upgrades to the existing Nuclear Power Training Center at Joint Base Charleston on the Cooper River, Charleston County, SC. This document provides a description of the proposed action and the alternatives considered for construction. The Department of the Navy (Navy) as the lead agency for this project, in cooperation with the Department of the Air Force, is requesting scoping comments to satisfy, in part, provisions of the National Environmental Policy Act of 1969 (NEPA), for the development of an Environmental Assessment (EA). The Service has reviewed the description of proposed action and offers the following comments for your consideration.

The preferred alternative directs much of the new development to areas above the mean high water mark. As such, the construction of new buildings and parking lots will result in impacts to jurisdictional forested wetlands on the property. The Service recommends avoiding or reducing the proposed fill to the maximum extent possible. For wetlands that cannot be avoided, compensation for impacts must follow the current U.S. Army Corps of Engineers Mitigation Guidelines and the Federal Mitigation Rule. For additional comments on wetland impacts, we recommend the Navy contact other Federal and State resource agencies such as the National Marine Fisheries Service, South Carolina Department of Natural Resources and the South Carolina Department of Health and Environmental Control regarding this project.

Documentation on impacts to species protected by the Endangered Species Act of 1973 (ESA) must be evaluated in the upcoming EA. Pursuant to section 7 of the ESA, the Navy must ensure the proposed action will not jeopardize the continued existence of threatened and endangered species. We recommend performing a survey of the property for the presence of protected species and suitable habitat. Considerations must also extend beyond the physical boundaries of the project as Charleston County harbors several highly mobile species such as the American woodstork, *Mycteria americana* and the West Indian manatee, *Trichechus manatus*, that may temporarily use resources on and around the training center. Construction, dredging, and future operational activities at the Nuclear Training Center may impact other federally protected species, including migratory birds protected under the Migratory Bird Treaty Act.

The Service appreciates the opportunity to provide comments on the proposed plan and is available to assist you with future project development. If you have any questions on Service comments, please contact Mark Caldwell at (843) 727-4707 ext. 215.

Sincerely,

Thomas D. McCoy

for Jay B. Herrington
Field Supervisor

JBH/MAC

Currin, Thomas A CIV NAVFAC SE, Environmental

From: Larry Gissentanna [Gissentanna.Larry@epamail.epa.gov]
Sent: Monday, August 01, 2011 8:58 AM
To: Currin, Thomas A CIV NAVFAC SE, Environmental
Cc: Heinz Mueller
Subject: Naval Nuclear Power Training Unit-Charleston Scoping

Commanding Officer
Naval Facilities Engineering Command Southeast
Attn: Mr Tom Currin, NAVFAC SE (EV21)
P.O. Box 30A
Jacksonville, FL 32212-0030

Dear Mr Tom Currin,

Consistent with Section 102(2)(c) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) appreciates the opportunity to provide scoping comments on the Naval Nuclear Power Training Unit-Charleston Project.

EPA's preliminary concerns at this time can be summarized to include the following:

* Purpose & Need - The EA should discuss if the proposed improvements to the Naval Nuclear Power Training Unit-Charleston is intended to increase waterway traffic as well as provide necessary Training, Safety and security improvements to the facility and port area. The EA document should also discuss the future increase in personnel and naval fleet mix that is expected to use the port.

* Air Quality - The project must also be consistent with General Conformity requirements to the extent that predicted air emissions are above de minimis levels for this proposal. Additional air quality concerns include the secondary impacts often associated with additions to administrative buildings relative to additional generators and vehicular emissions from increased traffic and any requirements relating to Transportation Conformity. We encourage you to work with the South Carolina Department of Health and Environment Control (SCDHEC) to ensure consistency in your emissions estimates and the South Carolina State Implementation Plan (SIP). http://www.scdhec.gov/environment/baq/Regulation-SIPManagement/state_implementation_plan.asp .

* Noise - The selected site should avoid if possible, the use of non-compatible land in order to minimize noise impacts to any nearby residents. My Initial glance at Figure 1-2 does not indicate any nearby residences, therefore noise may only be limited to nearby recreational boaters/fishermen. We would be interested in the results of your noise screening model as it relates to the need for any Integrated Noise Model (INM) modeling in this case. The EA should also discuss the general naval fleet mix that is expected to use the port as a result of the facility expansion. Would the port/docks, for example, support the use of new/additional fleet? If so, if noise is an issue, are there plans to map any noise sensitive areas and develop a noise abatement program that would operationally avoid these areas?

* Waters of the United States - Consistent with Section 404 of the Clean Water Act, the selected site should avoid and minimize, to the maximum extent practicable, placement of fill into jurisdictional waters of the United States, which include wetlands and streams. Any potential site should be assessed (delineated) for the presence of federally jurisdictional waters. It should be noted that jurisdictional waters of the United States can differ from waters of the State subject to State of South Carolina laws and regulations, and which are the basis for any County issued permits. Any fill material in waters of the United States will require a permit or authorization from the Atlanta Office of the Savannah District U.S. Army Corps of Engineers (COE). We encourage you to initiate coordination with the COE as soon as your preferred site is identified and if there will be wetland or stream impacts associated with the runway expansion project. The COE permit review process will require presentation of all alternative sites evaluated for the project along with measures to avoid or minimize impacts on your preferred site.
As part of the permit process, the COE will also require an assessment of archeological and historic resources on the entire project site and the identification of any potential impacts to federally listed
threatened and endangered species. EPA is involved in the review of
all of this information as part of the COE Section 404 permit process.
Any wetland or stream losses allowed under a COE Section 404 permit will also have to be mitigated by the applicant. This mitigation can be designed and implemented by the applicant or procured by the purchase of wetland and/or stream mitigation credits from a commercial wetland
mitigation bank. Wetland and stream mitigation can add considerable
expense to any project, which is another good reason to avoid and minimize those impacts.

* Environmental Justice (EJ) - The environmental, socioeconomic and health related impacts to potential EJ populations should be evaluated in the proposed EA. The demographics of the area should be documented in terms of the existence of minority and low-income populations. This description should include US Census data for the geographic unit(s) such as the Census Block Group(s) (BGs) encompassing the airport. At a minimum, the percentages of minority and low-income populations within these BGs should be documented and compared against other demographics of the area, as well as against the percentages of neighboring BGs, counties and the State of MS. In addition, other demographic factors like population age, density, literacy, etc. may also be important to the overall assessment. Meaningful collaboration with the community can also help to identify whether any "pockets" (concentrations) of EJ communities exist within a BG that otherwise (as a whole) may have a relatively low percentage of minorities and low-income populations. We suggest coordination with local community leaders and groups in an effort to engage these communities in the scoping, assessment and project design process. The EA should include maps of the surrounding communities and indicate the proximity of communities with potential EJ concerns to the proposed project area.

Depending on the outcome of the EJ assessment, it may be necessary to enhance public participation with susceptible EJ communities to better understand their concerns and to identify whether there is an increased potential for exposure to environmental hazards associated with the expansion of the proposed project. The EA should identify whether multiple or cumulative impacts are likely to occur. Any benefits to the affected communities that may be derived from the project should be also included in the EA including any construction or operation jobs related to the proposed airport expansion, or local training for those jobs. If the environmental impacts of the proposed project appear to fall disproportionately minority and/or low income populations, then mitigation options should also be considered.

For additional information, EPA Region 4's interim EJ policy can be emailed upon request. EPA Guidance for Consideration of EJ in Clean Air Action Section 309 Reviews and EPA Guidance for

Incorporating EJ Concerns in EPA's NEPA Compliance Analyses can be found at our website at http://www.epa.gov/compliance/resources/policies/nepa/index.html.
Demographic information can be found at the U.S. Census Bureau - 2010, U.S. Bureau of Labor Statistics, LAUS, and U.S. Bureau of Economic Analysis, REIS, 2005. Publically available EPA Web-based tools can also be used to conduct preliminary screening level EJ reviews. EJView: http://epamap14.epa.gov/ejmap/entry.html and NEPAssist:
https://oasext.epa.gov/NEPA/ . The information from these sources should be used in conjunction with information acquired the public involvement, community interviews, surveys and ground verification processes.
Additional EJ clarification is available through Ntale Kajumba at 404/562-9620 or kajumba.ntale@epa.gov).

* NPDES - National Pollutant Discharge Elimination System (NPDES) permit coverage for both project construction and operation are needed for point-source discharges. Although EPA retains oversight for the delegated NPDES Program, contact SCDHEC for your permitting requirements for this project.

* Ground-Water Quality - In addition to waters of the United States and NPDES issues, there may be additional water quality concerns for the proposal that relate to groundwater. According to the initial scoping letter, it appears that the demolition of some existing buildings will occur. The EA should consider identifying on site buildings that may have drinking water wells or monitoring wells to ensure they are not damaged or properly closed prior to construction.
These wells can serve as a conduit to contaminate ground water.
Properly close drinking water/irrigation/monitoring wells if necessary, and discuss this in your EA.

* Cultural Resources - Impacts to historic and archaeological resources must also be reviewed, with listed sites avoided or appropriately relocated to the satisfaction of the South Carolina State Historic Preservation Officer (SHPO). http://shpo.sc.gov/.

* Cumulative Impacts - The EA should also consider the cumulative impacts of the proposed project, particularly for those impacts generated by the project (e.g., noise and air quality). That is, the EA should discuss all (federal and non-federal) past, present, proposed and future (foreseeable within some 10-15 yrs) projects that are within the designated project area or affect that area (e.g., air/water currents).
Such project areas are often designated by logical geographic boundaries such as watersheds or airsheds, or by other methods. The cumulative impact analysis can be important for even small projects if their proposed location is in an area that is already extensively developed.

* Installation Restoration- The EA should mention any contaminated sites on the facility / installation that are near or will be use as part of the new construction site.

Again, Thank you for the opportunity to provide comments to your project scoping letter, if you have any question, feel free to contact me via the information provided below..

Larry O. Gissentanna
DoD and Federal Agency, Project Manager
NEPA Program Office
US EPA/Region 4
404-562-8248
gissentanna.larry@epa.gov

South Carolina Archives & History Center

HISTORY & HERITAGE FOR ALL GENERATIONS

July 7, 2011

Mr. Tom Currin
Naval Facilities Engineering Command Southeast
P.O. Box 30 A
Jacksonville, FL 32212-0030

Re: Nuclear Power Training Unit Expansion
Charleston County, South Carolina
SHPO No. 11CW0375

Dear Mr. Currin:

Our office received a letter from Regional Environmental Director, C. R. Destafney on June 13. We also received the maps and plans as supporting documentation for this undertaking. The State Historic Preservation Office is providing comments to the Navy pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR 800. Consultation with the SHPO is not a substitution for consultation with Tribal Historic Preservation Offices, other Native American tribes, local governments, or the public.

Based on the description of the Area of Potential Effect (APE) and the identification of historic properties within the APE, our office concurs with the assessment that no properties listed in or eligible for listing in the National Register of Historic Places will be affected by this project.

If archaeological materials are encountered during construction, the procedures codified at 36 CFR 800.13(b) will apply. Archaeological materials consist of any items, fifty years old or older, which were made or used by humans. These items include, but are not limited to, stone projectile points (arrowheads), ceramic sherds, bricks, worked wood, bone and stone, metal and glass objects, and human skeletal materials. The Navy should contact our office immediately.

If you have any questions, please contact me at (803) 896-6181 or jbarnes@scdah.state.sc.us.

Sincerely,

Jodi Barnes

Jodi Barnes, PhD
Staff Archaeologist/GIS Coordinator
State Historic Preservation Office

Currin, Thomas A CIV NAVFAC SE, Environmental

From: Wilson, Shelly [wilsonmd@dhec.sc.gov]
Sent: Friday, July 22, 2011 11:23 AM
To: Currin, Thomas A CIV NAVFAC SE, Environmental
Cc: Petrus, Laurel B.; Sanford-Coker, Christine
Subject: Environmental Assessment for Nuclear Power Training Unit-Charleston

Mr. Currin,

The South Carolina Department of Health and Environmental Control (DHEC) has reviewed the Naval Nuclear Power Training Unit-Charleston (NPTU Charleston), Joint Base Charleston Description of Proposed Action and Alternatives dated June 2011. At this time DHEC has no comments on the document. Thank you for the opportunity to review the proposal.

If you have any further questions, please contact me at (803) 896-8955.

--

Shelly Wilson
Federal Facilities Liaison
Environmental Quality Control
South Carolina Department of Health and Environmental Control 2600 Bull Street, Columbia, SC 29201
(803) 896-8955
wilsonmd@dhec.sc.gov

Nikki R. Haley
Governor

SOUTH CAROLINA
DEPARTMENT OF COMMERCE

Robert M. Hitt III
Secretary

July 7, 2011

Commanding Officer
Naval Facilities Engineering Command Southeast
Attn: Mr. Tom Currin, NAVFAC SE (EV21)
Post Office Box 30A
Jacksonville, FL 32212-0030

Dear Mr. Currin,

Thank you for allowing us to review and comment on the proposed infrastructure improvements and expansion to support Nuclear Power Training Unit Charleston operations and training at Joint Base Charleston, South Carolina.

After careful review the Department of Commerce has no negative comment regarding the project.

Sincerely yours,

George B. Patrick III
Deputy Secretary

GBP/vw

1201 Main Street, Suite 1600, Columbia, SC 29201
Tel: (803) 737-0400 • Fax: (803) 737-0418 • www.sccommerce.com

JOE DANING
District No. 92
Berkeley County

Committees:
Education and Public Works
Interstate Cooperation
Transportation and Roadways
Subcommittee, Chair

The House of Representatives

P.O. BOX 11867
Columbia 29211

Home
118 Queensbury Circle
Goose Creek, SC 29445
Tel. (843) 553-9288

Columbia
310-D Blatt Building
Columbia, SC 29211
Tel. (803) 734-2951
JoeDaning@scstatehouse.net

June 29, 2011

Mr. Tom Currin, NAVFAC SE (EV21)
Commanding Officer
Naval Facilities Engineering Command SE
PO Box 30A
Jacksonville Florida 32212-0030

Dear Mr. Currin:

Thank you for providing me with the information about infrastructure improvements and expansion to support the nuclear power training unit in Charleston SC. I am glad to support the expansion of the nuclear center and proud of the cooperation between the Navy and the Air Force in this joint effort to improve this facility. I am impressed with the plans to expand and upgrade NPTU Charleston's academic, administrative, and training facilities.

I appreciate the fact that as part of your coordination and consultation responsibilities you are complying with provisions of the National Environmental Policy Act of 1969 (NEPA). This is important that we are all concerned with the environment and conservation of our natural resources.

Because I worked for the Navy in a nuclear capacity, I am sure that the project will be done correctly. Additionally, as the member of the SC House of Representatives from this area, I am confident this project will have a positive economic impact on the surrounding area before the completion of the project and afterwards. Thank you for giving me this opportunity to express my support of this project and the benefits it will bring to our communities.

Sincerely,

Joe Daning

Joseph S. Daning

JSD/ma

DEPARTMENT OF THE NAVY
COMMANDER NAVY REGION SOUTHEAST
BOX 102, NAVAL AIR STATION
JACKSONVILLE, FLORIDA 32212-0102

5090
Ser N45/ 365
JUN 9 2011

RECEIVED JUN 13 2011

Mr. George Wickliffe
Chief, United Keetoowah Band of Cherokee Indians in Oklahoma
P.O. Box 746
Tahlequah, OK 74465-0746

Dear Mr. Wickliffe:

SUBJECT: COORDINATION AND SCOPING WITH THE DEPARTMENT OF THE NAVY ENVIRONMENTAL ASSESSMENT FOR INFRASTRUCTURE IMPROVEMENTS AND EXPANSION TO SUPPORT NUCLEAR POWER TRAINING UNIT CHARLESTON OPERATIONS AND TRAINING AT JOINT BASE CHARLESTON, SOUTH CAROLINA

As the lead agency, the Department's of the Navy (Navy) and Air Force, as a cooperating agency, are preparing an Environmental Assessment (EA) to assess the impacts of infrastructure improvements and expansion at Nuclear Power Training Unit-Charleston (NPTU Charleston) on Joint Base Charleston (JB CHS), SC. Per the National Environmental Policy Act (NEPA) of 1969, a letter was sent to the local government agencies; however due to your status as a sovereign nation, the Navy and the Air Force are sending this letter requesting tribal input. Attached as enclosure (1), please find the Description of Proposed Action and Alternatives requesting your review and comment.

NPTU Charleston's mission is to provide prospective naval nuclear propulsion plant operators and officers with training and certification in the actual hands-on operation of a nuclear propulsion plant. The proposed action, purpose, need, and alternatives are discussed in enclosure (1). Under the proposed action, the Navy would expand and upgrade NPTU Charleston's academic, administrative, and training facilities to alleviate current overcrowding, accommodate increased student throughput (with an associated increase in NPTU staff), provide facilities for transitioning to newer Moored Training Ships (MTSs), allow for uninterrupted student training during MTS transition, and ensure all facilities meet applicable security requirements.

The United Keetoowah Band of Cherokee Indians in Oklahoma has no objection to the referenced project. However, if any remains, artifacts or other items are inadvertnetly discovered, please cease construction immediately and contact us at 918-453-6533 or by letter.

Lisa C. Stopp, Tribal NAGPRA POC 7-8-11
Date

The Choctaw Nation of Oklahoma takes pride in answering all Section 106 request. And we are in the process of asking that all agencies only send request that are in our areas of interest. This will help us better serve agencies in a timely manner. A list of States and Counties are listed below. However if you have a request that you feel needs to be brought to our attention please feel free to send it to us.

	Alabama	26	Perry	10	Claiborne		Oklahoma
1	Baldwin	27	Pope	11	Concordia	1	Atoka
2	Choctaw	28	Prairie	12	East Baton Rouge	2	Bryan
3	Clarke	29	Pulaski	13	East Carroll	3	Choctaw
4	Coffee	30	Saline	14	East Feliciana	4	Coal
5	Conecuh	31	Sebastian	15	Evangeline	5	Haskell
6	Covington	32	Sevier	16	Franklin	6	Hughes
7	Dale	33	St. Francis	17	Grant	7	Latimer
8	Fayette	34	Union	18	Iberia	8	LeFlore
9	Geneva	34	Yell	19	Iberville	9	McCurtain
10	Greene			20	Jackson	10	Pittsburg
11	Hale		Florida	21	Jefferson	11	Pushmataha
12	Houston	1	Bay	22	La Salle		
13	Lamar	2	Calhoun	23	Lafourche		Tennessee
14	Marengo	3	Columbia	24	Lincoln	1	Shelby
15	Mobile	4	Dixie	25	Livingston		
16	Monroe	5	Escambia	26	Madison		Texas
17	Pickens	6	Franklin	27	Morehouse	1	Bowie
18	Sumter	7	Gadsden	28	Natchitoches	2	Clay
19	Tuscaloosa	8	Gilchrist	29	Orleans	3	Cooke
20	Walker	9	Gulf	30	Ouachita	4	Fannin
21	Washington	10	Hamilton	31	Plaquemines	5	Grayson
		11	Holmes	32	Pointe Coupee	6	Hardeman
	Arkansas	12	Jackson	33	Rapides	7	Lamar
1	Arkansas	13	Jefferson	34	Red River	8	Montague
2	Ashley	14	Lafayette	35	Richland	9	Red River
3	Bradley	15	Leon	36	St. Bernard	10	Rusk
4	Calhoun	16	Liberty	37	St. Charles	11	Smith
5	Chicot	17	Madison	38	St. Helena	12	Wichita
6	Clark	18	Okaloosa	39	St. James		
7	Conway	19	Santa Rosa	40	St. John the Baptist		
8	Crawford	20	Suwannee	41	St. Landry		
9	Crittenden	21	Taylor	42	St. Martin		
10	Desha	22	Wakulla	43	St. Mary		
11	Drew	23	Walton	44	St. Tammany		
12	Faulkner	24	Washington	45	Tangipahoa		
13	Franklin			46	Terrebonne		
14	Hempstead		Kentucky	47	Tensas		
15	Hot Springs	1	Scott	48	Union		
16	Howard			49	Washington		
17	Jefferson	1	Louisiana	50	Webster		
18	Johnson	2	Ascension	51	West Baton Rouge		
19	Lincoln	3	Assumption	52	West Feliciana		
20	Little River	4	Avoyelles	53	Winn		
21	Logan	5	Bienville				
22	Lonoke	6	Bossier		Mississippi		
23	Monroe	7	Caddo		Entire State		
24	Nevada	8	Caldwell				
25	Ouachita	9	Catahoula				

DRAFT ENVIRONMENTAL ASSESSMENT RESPONSES

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

March 20, 2012

Commanding Officer
Naval Facilities Engineering Command Southeast
P.O. Box 30A (Bldg. 903/EV21)
Jacksonville, FL 32212-0030

Attn: Tom Currin

Re: Environmental Assessment, Nuclear Power Training Unit, Joint Base Charleston, Charleston County, FWS Log No. 2012-CPA-0081 and 2012-I-0193

Dear Sir:

The U.S. Fish and Wildlife Service (Service) has reviewed the Environmental Assessment (EA) for the proposed improvements and upgrades to the existing Nuclear Power Training Unit (NPTU) at Joint Base Charleston on the Cooper River, Charleston County, SC. The proposed improvements are to upgrade existing facilities and infrastructure and will occur on both the upland and in-water portions of the NPTU. The Department of the Navy (Navy), as the lead agency for this project, in cooperation with the Department of the Air Force, is requesting scoping comments to satisfy, in part, provisions of the National Environmental Policy Act of 1969. The Service has reviewed the EA and offers the following comments for your consideration.

The preferred alternative directs much of the new development to areas above the mean high water mark. As such, the construction of new buildings and parking lots will result in impacts to jurisdictional forested wetlands on the property. The Service recommends avoiding or reducing the proposed fill to the maximum extent possible. For wetlands that cannot be avoided, compensation for impacts must follow the current U.S. Army Corps of Engineers Mitigation Guidelines and the Federal Mitigation Rule. For additional comments on wetland impacts we recommend the Navy contact other Federal and State resources agencies such as the National Marine Fisheries Service, South Carolina Department of Natural Resources, and the Department of Health and Environmental Control regarding this project.

As requested in the Service's June 21, 2011, correspondence, the Navy examined the project's potential impact on federally protected threatened and endangered species. As noted in Section 3.4.2.3 of the EA the Navy determined that the upland portions of the NPTU facility does not contain suitable habitat nor any of the protected species known to occur in Berkeley County. The Navy determined that the project activities would not adversely affect migratory or highly mobile terrestrial species (i.e., American woodstork).

To construct the pier, the Navy will use a watercraft to pile drive the post into the ground. The EA determined that these activities will also not be likely to adversely affect protected aquatic species such as the West Indian manatee, *Trichechus manatus*, with the utilization of applicable Best Management Practice's. The Service is uncertain to which BMP's the Navy is referring, however, we recommend utilizing the Standard Manatee Guidelines (copy attached) for all in water activities.

Based on our review and the information received the proposed improvements to the NPTU (using the manatee guidelines), the Service concurs that the project is not likely to adversely affect threatened or endangered species nor adversely modify critical habitat as protected by the Endangered Species Act of 1973 (ESA). Please note that obligations under section 7 of the ESA must be reconsidered if: (1) new information reveals impacts of this identified action may affect any listed species or critical habitat in a manner not previously considered; (2) this action is subsequently modified in a manner, which was not considered in this assessment; or (3) a new species is listed or critical habitat is designated that may be affected by the identified action.

The Service appreciates the opportunity to provide comments on the proposed project and is available to assist you with future project development. If you have any questions on Service comments, please contact Mr. Mark Caldwell at (843) 727-4707 ext. 215 and reference FWS Log No. 2012-CPA-0081.

Sincerely,

Thomas D. McCoy

for Jay B. Herrington
Field Supervisor

JBH/MAC

Manatee Guidelines

To reduce potential construction-related impacts to the manatee to discountable and insignificant levels, the Service recommends implementing the *Standard Manatee Construction Conditions*, which are as follows:

The permittee will comply with the following manatee protection construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel must monitor water-related activities for the presence of manatee(s) during May 15 - October 15.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973.

c. Any siltation barriers used during the project shall be made of material in which manatees cannot become entangled and must be properly secured, and regularly monitored to avoid manatee entrapment.

d. All vessels associated with the project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

e. If manatee(s) are seen within 100 yards of the active construction area all appropriate precautions shall be implemented to ensure protection of the manatee. These precautions shall include the operation of all moving equipment no closer than 50 feet to a manatee. Operation of any equipment closer than 50 feet to a manatee shall necessitate immediate shutdown of that equipment. Activities will not resume until the manatee(s) has departed the project area of its own volition.

f. Any collision with and/or injury to a manatee shall be reported immediately to Nicole Adimey of the U.S. Fish and Wildlife Service, North Florida Field Office, at (904) 731-3079.

-----Original Message-----
From: Bo Petersen [mailto:bopete@postandcourier.com]
Sent: Wednesday, February 15, 2012 14:19
To: Currin, Thomas A CIV NAVFAC SE, Environmental
Subject: RE: reporter contact

Tom,

What happens to the old MTS nuclear subs when they are replaced with the next generation? What about the cores?

Also, editors asked:

How many NPTU schools does the Navy have? Are they progressive, meaning is the Charleston base school an entry level, or a higher phase of training?

Still waiting for Joint Base Charleston to get back to me and thought I'd clear up this much in the meantime.

Thanks,

Bo Petersen

Reporter
The Post and Courier
Charleston, SC
843 937 5744

-----Original Message-----
From: Currin, Thomas A CIV NAVFAC SE, Environmental
[mailto:thomas.currin@navy.mil]
Sent: Wednesday, February 15, 2012 1:11 PM
To: Bo Petersen
Subject: RE: reporter contact

Mr. Petersen,
Sorry we have some technical problems with the website. It will be up later this afternoon. I've attached the EA for your review per your phone call.
I will forward your request to the Joint Base Charleston PAO and my NPTU contacts concerning information you wish to discuss.

From:	Currin, Thomas A CIV NAVFAC SE, Environmental
To:	Ward, John S CTR NNPTU, RTI
Cc:	cpwirth@tecinc.com; klrose@tecinc.com; mdharrison@tecinc.com; andrew.smith@unnpp.gov; Biller, Kurt D CTR TRAINING; Iannacci, Laura A; Kammerer, Daniel P CTR NNPTU, MTS Engineering; Kemp, Royce B CIV NAVFAC SE, Environmental; CAMP, JOE V JR GS-11 USAF AMC 628 CES/CEAO; Currin, Thomas A CIV NAVFAC SE, Environmental; EPSTEIN, MARK A GS-12 USAF AMC 628 CES/CEAO; Takacs, Paul E Civ USAF AMC A7/A7PI; URRUTIA, ALVARO E GS-11 USAF AMC 628 CES/CEAO
Subject:	FW: NPTU Charleston Facilities Expansion- EPA F-F Response
Date:	Thursday, May 31, 2012 4:05:45 PM

All,
Attached email chain EPA response concerning the Draft FONSI-FONPA Review.
EPA concurred with the Navy's selection of ALT 1 Preferred Alternative but requested we strengthen the Alt 1 section with reasons why this was chosen over the other alternatives.
Tom
-----Original Message-----
From: Currin, Thomas A CIV NAVFAC SE, Environmental
Sent: Thursday, May 31, 2012 16:55
To: 'Larry Gissentanna'
Cc: Heinz Mueller; Traci Buskey
Subject: RE: NPTU Charleston Facilities Expansion

Dear Mr. Larry O. Gissentanna,

I acknowledge the receipt of your email of Thursday, May 31, 2012 16:10 concerning the FONSI-FONPA of NPTU Charleston Facilities Expansion.
Per our phone conversion earlier today, we will strengthen the paragraph with reasons why we selected the preferred alternative.

Thank you for your comments and the concurrence the preferred alternative.

Tom

Thomas A. Currin
NAVFAC SE Code EV-21
Box 30, Bldg 903
NAS Jacksonville, FL 32212-0030
904-542-6301, DSN: 942-6301 Fax 904-542-6345

-----Original Message-----
From: Larry Gissentanna [mailto:Gissentanna.Larry@epamail.epa.gov]
Sent: Thursday, May 31, 2012 16:10
To: Currin, Thomas A CIV NAVFAC SE, Environmental
Cc: Heinz Mueller; Traci Buskey
Subject: RE: NPTU Charleston Facilities Expansion

Dear Mr Thomas Currin,

Acknowledge receipt of The Department Of The Navy letter dated 2 May 2012. Subject Draft Finding of No Significant Impact/Finding of No Practicable Alternative For the Facilities Expansion At the Nuclear Power Training Unit Charleston, Joint Base Charleston, Berkeley County, South Carolina.

After review of the above subject document, EPA submits the following comment. Line 44 "Alternative 1 (Preferred Alternative), please elaborate within this paragraph as to why this alternative is best compared to the other alternatives, for example, Alternative 1 minimizes, parking, wetlands, length of pier etc.

EPA concurs with the U.S. Navy's Preferred Alternative, Alternative 1. If you have any questions, don't hesitate to email me or give me a call.

Again, Thank you for the opportunity to provide comments.

DoD and Federal Agency, Project Manager
NEPA Program Office
U.S. Environmental Protection Agency/ Region 4
61 Forsyth Street, SW
Atlanta, GA 30303-8960
Office: 404-562-8248
gissentanna.larry@epa.gov

Inactive hide details for "Currin, Thomas A CIV NAVFAC SE, Environmental" ---03/28/2012 01:01:55 PM---Dear Mr. Gissentanna, I a"Currin, Thomas A CIV NAVFAC SE, Environmental" ---03/28/2012 01:01:55 PM---Dear Mr. Gissentanna, I acknowledge receiving the email of Tuesday, March 27, 2012-13:47 commenting

From: "Currin, Thomas A CIV NAVFAC SE, Environmental" <thomas.currin@navy.mil>
To: Larry Gissentanna/R4/USEPA/US@EPA
Cc: Heinz Mueller/R4/USEPA/US@EPA, Traci Buskey/R4/USEPA/US@EPA, "Ward, John S CTR NNPTU, RTI" <john.s.ward.ctr@navy.mil>, "Kemp, Royce B CIV NAVFAC SE, Environmental" <royce.kemp@navy.mil>, "Rose, Kathy L" <Kathy.Rose@cardnotec.com>
Date: 03/28/2012 01:01 PM
Subject: RE: NPTU Charleston Facilities Expansion Draft Environmental

---

Dear Mr. Gissentanna,

I acknowledge receiving the email of Tuesday, March 27, 2012-13:47 commenting on the Department of the Navy's Draft Environmental Assessment (EA) for Nuclear Power Training Unit Charleston Facilities Expansion.
We appreciate your comments concerning the wetland issues; the Navy and Air Force team is coordinating with the Army Corps of Engineers and is developing a mitigation plan to address these issues and prepare for the permitting process.
The Navy and Air Force will continue to keep the community involved. A Draft FONSI/FONPA is being developed for a Public review and the Final FONSI/FONPA summary will be published in the local newspaper after signatures; the documents will be available on our website. We intend to submit a copy of the Draft FONSI/FONPA to you for your comment during the public review.
Thank you for the EPA's concurrence with the Preferred Alternative and understanding that all major issues have been addressed.
We are proceeding to finalize the EA to address comments and final issues.
We will provide you an electronic copy of the Final EA and FONSI/FONPA documentation as requested.

Thank you for your prompt response.

Respectfully,
Tom
Thomas A. Currin
NAVFAC SE Code EV-21
Box 30, Bldg 903
NAS Jacksonville, FL 32212-0030
904-542-6301, DSN: 942-6301 Fax 904-542-6345

-----Original Message-----
From: Larry Gissentanna [mailto:Gissentanna.Larry@epamail.epa.gov]

Sent: Tuesday, March 27, 2012 13:47
To: Currin, Thomas A CIV NAVFAC SE, Environmental
Cc: Heinz Mueller; Traci Buskey
Subject: NPTU Charleston Facilities Expansion Draft Environmental

Commanding Officer
Naval Facilities Engineering Command Southeast
Attn: Mr Tom Currin, NAVFAC SE (EV21)
P.O. Box 30A (Bldg 903/EV21
Jacksonville, FL 32212-0030

Dear Mr Tom Currin,

Consistent with Section 102(2)(c) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) appreciates the opportunity to review the Draft Environmental Assessment (EA) on the Naval Nuclear Power Training Unit-Charleston Project.

EPA understands that The United States Navy (Navy) has prepared this environmental assessment (EA) to assess potential impacts from proposed infrastructure improvements needed to accommodate current, as well as anticipated increase of student numbers at the Nuclear Power Training Unit-Charleston (NPTU Charleston), South Carolina (SC). The NPTU is located in Berkeley County, along the Cooper River, on Joint Base Charleston. Joint Base Charleston is composed of two major enclaves, one being the airfield denoted as Joint Base Charleston – Air (JB CHS-A); the other being the former Naval Weapons Station, now denoted as Joint Base Charleston – Weapons (JB CHS-W), EPA further understands that infrastructure improvements are needed such as, building various structures, demolishing certain structures to make room for new ones, constructing parking lots and upgrading utilities.

From EPA's perspective it appears that the major issues, e.g., noise, wetlands, and water/air quality, energy and environmental justice outlined in our previous correspondence, dated 01 August 2011, have been addressed in this Draft EA. We understand that wetlands cannot be avoided and Section 404 Clean Water Act permitting will be obtained and the required compliance with USACE Mitigation Guidelines and the Federal Mitigation Rule will be undertaken prior to construction. It is expected that appropriate wetland banking credits will be purchased to offset any impacts.

Continue to keep the local community informed and involved throughout the project process; by having community meetings and/or updating the community through local media (radio, local paper and TV).

EPA concurs with the U.S. Navy's Preferred Alternative, Alternative 1.

Upon completion of your Final Environmental Assessment, please forward an electronic copy to this office:

Again, Thank you for the opportunity to provide comments to your Draft EA.

Larry O. Gissentanna
DoD and Federal Agency, Project Manager
NEPA Program Office
U.S. Environmental Protection Agency/ Region 4
61 Forsyth Street, SW
Atlanta, GA 30303-8960
Office: 404-562-8248
gissentanna.larry@epa.gov

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727) 824-5317; FAX (727) 824-5300
http://sero.nmfs.noaa.gov/

March 8, 2012 F/SER47:JD/pw

(Sent via Electronic Mail)

Commanding Officer
Naval Facilities Engineering Command Southeast
NAVFAC SE (EV21)
P.O. Box 30A
Jacksonville, Florida 32212-0030

Attention: Tom Currin

Dear Mr. Currin:

NOAA's National Marine Fisheries Service (NMFS) reviewed the Department of the Navy's (Navy) draft Environmental Assessment (EA) for *Nuclear Power Training Unit Charleston Facilities Expansion,* dated February 2012. On February 28, the Navy, in coordination with the Department of the Air Force, requested NMFS provide comments on the draft EA in accordance with the National Environmental Policy Act (NEPA). The Navy indicated that comments received will aid in their project planning and environmental analysis.

NPTU Charleston's mission is to provide prospective nuclear propulsion plant operators and offices training in the hands-on operation of a nuclear propulsion plant. The Navy has determined that the current infrastructure of NPTU is not adequate to accommodate the needs of current and prospective students. As such, the Navy proposes to demolish, renovate, and upgrade existing facilities and infrastructure; construct academic and training facilities; relocate support systems; increase the number of parking spaces; expand pier facilities; and install a fence within tidally influence wetlands. The draft EA analyzes a "no action" alternative and five work alternatives. All alternatives are similar in nature but differ slightly in pier expansion and parking facility design. Alternative 5 eliminates the construction of training support building 2.

NMFS Comments
Need for an EFH Assessment: Based on the location and scope of the proposed project, NMFS recommends an essential fish habitat (EFH) assessment be included in the final EA; 50 CFR § 600.920 describes the contents of an EFH assessment in a tiered manner. The assessment should include: (i) a description of the proposed action, (ii) an analysis of the potential adverse effects of the proposed action on EFH and managed species, (iii) the Navy's conclusions regarding the effects of the proposed action on EFH, and (iv) proposed mitigation, if applicable. Specific information about the project design and construction methods within EFH should be described, including acreage impacted by type of activity. Within the action area, EFH includes estuarine emergent vegetation (i.e., salt marsh), intertidal and subtidal mudflats, unconsolidated bottom, oysters, and tidal creeks.

As described in 50 CFR 600.920, a federal agency may incorporate an EFH Assessment into documents prepared for other purposes, such as the proposed NEPA document. The description of EFH currently on page 3-12 should be expanded to include federally-managed fisheries using the action area (e.g., penaeid shrimp, estuarine-dependent species of the snapper-grouper complex, summer flounder). Including a description of EFH and direct, indirect, and cumulative impacts to EFH and hydrologically connected wetlands (i.e., the freshwater wetlands proposed to be filled and excavated) in the EA would help facilitate the consultation during both the Navy's NEPA process and the U.S Army Corps of Engineer's 404 permitting process.

Alternatives Analysis: NMFS recommends the description of alternatives in the draft EA include a table outlining the types and amount of EFH impacted, by activity type. Currently, the general habitat classifications (e.g., wetlands) make it difficult for NMFS to determine how much EFH would be impacted by each alternative. Descriptions of impacts should include areas impacted by dredging, filling, shading, and installing the fence and pier pilings from both construction and operation of the proposed facility. A vegetated buffer of 75 to 100 feet should be provided between salt marsh and filled areas. These buffer widths are based on the Charleston District's Guidelines for Preparing a Compensatory Mitigation Plan and have been determined to provide the needed protection of waters from an adjacent industrial land use.

Construction Impacts: The draft EA should identify construction methods that would minimize impacts to EFH. For example, to minimize impacts to larval fish, dredging and filling EFH should be limited to late fall and winter months. Please note that our Protected Resources Division may request dredging not occur during winter and spring in order to minimize impacts to Atlantic sturgeon and shortnose sturgeon (both of these species listed as endangered under the Endangered Species Act). The Navy should demonstrate avoidance and minimization steps relevant to EFH in the final EA.

We appreciate the opportunity to provide these comments. Please direct related correspondence to the attention of Ms. Jaclyn Daly at our Charleston Area Office. She may be reached at (843) 762-8610 or by e-mail at Jaclyn.Daly@noaa.gov.

Sincerely,

Pace Wilber

/ for

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc:

Navy, Thomas.Currin@navy.mil
SCDNR, DavidS@dnr.sc.gov
SAFMC, Roger.Pugliese@safmc.net
EPA, Laycock.Kelly@epa.gov
FWS, Karen_Mcgee@fws.gov
F/SER4, David.Dale@noaa.gov
F/SER47, Jaclyn.Daly@noaa.gov

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
O:\forms\Sea Turtle and Smalltooth Sawfish Construction Conditions.doc

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV22/0305
June 1, 2012

Ms. Virginia M. Fay
National Marine Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701-5505

Dear Ms. Fay:

SUBJECT: RESPONSE TO THE ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS FOR THE NAVAL NUCLEAR POWER TRAINING UNIT (NPTU) CHARLESTON, JOINT BASE CHARLESTON NPTU FACILITIES EXPANSION DRAFT ENVIRONMENTAL ASSESSMENT

The Navy received the National Marine Fisheries Service (NMFS) Essential Fish Habitat (EFH) conservation recommendations for the Naval Nuclear Power Training Unit (NPTU) Charleston, Joint Base Charleston NPTU Facilities Expansion Draft Environmental Assessment (EA).

The NMFS conservation recommendation was that a vegetated buffer of at least 75-feet shall be present between all estuarine emergent marsh, new parking areas and walkways. The Navy reviewed the proposed parking and walkway locations, and the information it has on wetlands. It has determined a 75-foot buffer will be achievable, and will incorporate the buffer into the project design.

The NMFS also noted the draft EA does not outline a compensatory mitigation plan for offsetting unavoidable impacts to palustrine wetlands from the expanded parking areas and walkways, and recommended the final EA include a mitigation plan for offsetting these impacts. The Navy will ensure such a mitigation plan is included in the final EA.

The NMFS suggested pile driving and expansion of the port security barrier (PSB) may impact dolphins and suggested the Navy contact the South Carolina Marine Stranding Network (SCMSN) for guidance on protecting marine mammals during installation of the fence. NMFS further requested that Navy contact NMFS Office of Protected Resources to determine if consultation is needed under the Marine Mammal Protection Act (MMPA) due to pile driving activities. The Navy has contacted the SCMSN for guidance on the fence and will contact the NMFS Office of Protected Resources to determine if consultation is needed under the MMPA.

The Navy and the NMFS have a history of effective partnering and we appreciate the opportunity to continue that relationship with this project that is vital to our country's national security.

If you have any questions or need further information, please contact Mr. Doug Nemeth at commercial (904) 542-6313 or Email: doug.nemeth@navy.mil.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line Coordinator
By direction of the Commanding Officer

Copy to:
SCDNR, DavidS@dnr.sc.gov
SAFMC, Roger.Pugliese@safmc.net
EPA, Laycock.Kelly@epa.gov
FWS, Karen_Mcgee@fws.gov
N/SCI42, Wayne.McFee@noaa.gov
F/PR1, Jolie.Harrison@noaa.gov
F/SER4, David.Dale@noaa.gov
F/SER47, Jaclyn.Daly@noaa.gov

Currin, Thomas A CIV NAVFAC SE, Environmental

From: Jackson, Jered CIV NAVFAC SE
Sent: Monday, June 04, 2012 8:21 AM
To: Nemeth, Doug CIV NAVFAC SE; Currin, Thomas A CIV NAVFAC SE, Environmental
Cc: Howe, Barbara L CIV NAVFAC SE
Subject: FW: NPTU EFH - Navy Response
Signed By: jered.jackson@navy.mil

EFH Consultation is concluded.

JJ

-----Original Message-----
From: Jaclyn Daly [mailto:jaclyn.daly@noaa.gov]
Sent: Monday, June 04, 2012 8:17
To: Jackson, Jered CIV NAVFAC SE
Cc: Pace Wilber; Robin Wiebler
Subject: Re: NPTU EFH - Navy Response

Dear Mr. Jackson,
Thank you for the letter announcing the Navy's intent to adopt NMFS' EFH conservation recommendation of providing a 75-foot buffer between all parking lots and walkways and estuarine emergent vegetation (i.e., salt marsh) for expansion of the Naval Nuclear Power Training Unit (NPTU), Charleston. As such, NMFS concludes EFH consultation with the Navy for this project. Provided no major modifications to the project during the U.S. Army Corps of Engineers 404 permitting process needed for impacts to wetlands, NMFS does not intend to comment during the public notice phase. NMFS also appreciates the Navy's intent to further protect marine mammals by inquiring with the appropriate NOAA offices. If you have any further questions, please feel free to contact me at anytime.
Sincerely,
Jaclyn

On Mon, Jun 4, 2012 at 7:39 AM, Jackson, Jered CIV NAVFAC SE <jered.jackson@navy.mil> wrote:

Ms Fay,

Attached, please find a pdf version of the Navy's written response to NMFS' EFH Conservation Recommendation for the Naval Nuclear Power Training Unit (NPTU) Charleston, Joint Base Charleston NPTU Facilities Expansion Draft EA.

This letter was signed out on 1 June 2012 and the original has been mailed to you.

Very Respectfully,
Jered Jackson

Jered Jackson
Natural Resources Specialist
Naval Facilities Engineering Command, SE
PO Box 30, Bldg 903
Jacksonville, FL 32212

SCDOT

South Carolina
Department of Transportation

May 16, 2012

Commanding Officer
Naval Facilities Engineering Command Southeast
Attn: Mr. Tom Currin (EV21)
PO Box 30A, Bldg 903, Yorktown Avenue
Jacksonville, Florida 32212-0030

RE: Draft Finding of No Significant Impact/Finding of No Practicable Alternative for the Facilities Expansion at the Nuclear Power Training Unit Charleston, Joint Base Charleston, Berkeley County, South Carolina

Dear Mr. Currin:

This is in response to your letter of May 2, 2012, requesting a review of the Draft Finding of No Significant Impact/Finding of No Practicable Alternative (D-FONSI/FONPA) for the Facilities Expansion at the Nuclear Power Training Unit Charleston, Joint Base Charleston in Berkeley County, South Carolina. The D-FONSI/FONPA was reviewed by the South Carolina Department of Transportation Environmental Management Office. We have no questions or comments about the project at this time.

We appreciate the opportunity to review the D-FONSI/FONPA. Please contact me at 803-737-1399 if you have any further questions.

Sincerely,

Heather M. Robbins

Heather M. Robbins, AICP
NEPA Division Manager

HMR: hmr
ec: Robert J. St. Onge, Jr., Secretary of Transportation
John V. Walsh, P.E., Deputy Secretary for Engineering
Ron K. Patton, P.E., Chief Engineer for Planning, Location, and Design
Mark C. Lester, P.E., Director of Planning and Environmental
File: ENV/HMR

CTS 3024435

DEPARTMENT OF THE ARMY
CHARLESTON DISTRICT, CORPS OF ENGINEERS
69-A HAGOOD AVENUE
CHARLESTON, SOUTH CAROLINA 29403-5107

REPLY TO
ATTENTION OF

CESAC-RD

JUN 1

MEMORANDUM FOR Commanding Officer, Naval Facilities Command Southeast, (Mr. Tom Currin/NAVFAC SE (EV21)), Post Office Box 30A, Jacksonville, Florida 32212-0030

SUBJECT: Draft Finding of No Significant Impact/Finding of No Practicable Alternative for the Facilities Expansion at the Nuclear Power Training Unit Charleston, Joint Base Charleston, Berkeley County, South Carolina

1. This is in response to your letter dated 2 May 2012, regarding a Draft Finding of No Significant Impact and Finding of No Practicable Alternative (Draft FONSI/FONPA), and a Revised Draft Environmental Assessment (Revised Draft EA) to assess the impacts of infrastructure improvements and expansion at the Nuclear Power Training Unit- Charleston (NPTU Charleston). The U.S. Army Corps of Engineers is not providing comments on the Draft FONSI/FONPA because it does not meet our needs as described below in #3 and #4.

2. According to the Revised Draft EA, the proposed project will include the placement of fill material, modifications to an existing pier, relocation of an existing security barrier, and may require additional dredging in waters of the U.S. Therefore, a Department of the Army (DA) permit, pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, will be required for the proposed project.

3. NPTU Charleston is currently conducting some improvements to the existing upland facilities, such as increasing the overall number of parking spaces. It is our understanding that NPTU Charleston will submit an application for a DA permit once the EA for the proposed project has been completed and the necessary funding has been secured.

4. The Revised Draft EA includes new information about additional impacts (temporary vessel stabilization piles and alternate power supply lines) that were not discussed in the Draft EA. As stated in our previous letter dated 9 April 2012, we anticipate that the size, configuration, and potential impacts to waters of the United States associated with the proposed project will change during the development of final design drawings. Once you are ready to submit an application for a DA permit, please contact this office to schedule a pre-application meeting.

5. The Corps appreciates this opportunity to review the Revised Draft EA, and we look forward to working with you to evaluate the proposed project once you are further along in the design process. If you have any questions about our comments, please do not hesitate to contact our project manager Mr. Nathaniel I. Ball at 843-329-8047.

EDWARD P. CHAMBERLAYNE, P.E.
LTC, EN
Commanding

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
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(727) 824-5312; FAX (727) 824-5309
http://sero.nmfs.noaa.gov

F/SER31:AB

AUG 31 2012

Ms. C.R. Destafney
Environmental Business Line Coordinator
Naval Facilities Engineering Command Southeast
P.O. Box 30A (Bldg. 903/EV21)
Jacksonville, Florida 32212-0030

Re: Pier Expansion at the Naval Nuclear Power Training Unit Charleston, Berkeley County, South Carolina

Dear Ms. Destafney:

This responds to your April 25, 2012, letter. You requested National Marine Fisheries Service (NMFS) concurrence with your project-effect determinations under Section 7 of the Endangered Species Act (ESA). You determined the subject project may affect but is not likely to adversely affect shortnose and Atlantic sturgeons. You provided us with additional information on June 18, and July 23, 2012. Our findings on the project's potential effects are based on the project description in this response. Changes to the proposed action may negate our findings and require reinitiating consultation.

The Navy proposes to expand a training facility at the Naval Nuclear Power Training Unit, Charleston, located at 32.94487°N, 79.92863°W (North American Datum 1983), along the Cooper River, Berkeley County, South Carolina. The Navy will extend Pier X-ray North to accommodate a moored training ship, remove a finger pier, and expand the port security barrier (PSB) that surrounds the in-water portions of the facility. The proposed pier extension will measure up to 480 ft in length and 60 ft in width. Construction of the pier will require the installation (by impact driver) of an estimated two hundred and forty-two, 24-in concrete piles and eighteen, 30-in cylindrical steel piles (Navy may consider using a vibratory hammer for the steel piles). The Navy has agreed to pile-driving noise ramp-up procedures[1] to give any protected species in the area adequate time to leave on their own volition prior to pile installation. The expansion of the PSB may require the addition or repositioning of large (up to 12 ft x 6 ft x 6 ft) concrete anchors.

A special provision for the protection of threatened and/or endangered species is being implemented by the Navy for this project: no in-water work in the Cooper River will occur between October 1 and March 30 of any year. More specifically, no piles may be driven prior to May 1 and steel piles may only be driven between June 15 and August 30. Total time for in-water construction is expected to be about 10 months split over two years. The driving of steel piles, which is expected to have the greatest noise impact, is expected to occur over a period of nine days.

Two species of sturgeons (shortnose and Atlantic), protected by the ESA, can be found in or near the action area and may be affected by the project. The project is not located within critical habitat for any

[1] Dry-firing of the pile-driving hammer by raising and dropping the hammer with no compression of the pistons and slowly increasing the power of the hammer over a period of 30 minutes prior to actual pile driving activities.

listed species under NMFS' purview. Although sea turtles may use estuarine habitats, researchers have not documented any species of sea turtle 22 km upstream in the Cooper River and thus sea turtles are not considered in this consultation. That said, the Navy has agreed to comply with NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*, to err on the side of caution and conservation in the unlikely event a sea turtle does make its way this far upstream.

Shortnose sturgeon are known to inhabit the Cooper River and migrate seasonally between freshwater and mesohaline[2] areas within the river based on water temperature and salinity cues. Spring (upstream) spawning migrations are believed to be triggered when water temperatures warm above 8°C, typically during the late winter/early spring in southern rivers. Access to appropriate spawning habitat within the Cooper River is blocked by the Pinopolis Dam[3] and eggs deposited at the base of the dam do not successfully develop and hatch. Subsequent movement downstream is rapid and direct with individuals moving downriver and inhabiting an 18-km stretch nearby Cote Bas (rkm 30.6–48.0) during spring and summer.[4] During fall and winter, shortnose sturgeon are known to occupy an area further downstream around rkm 27.1-32.6.[4] Both the summer and fall areas where sturgeon are known to aggregate are upstream of the project area.

Atlantic sturgeon are known to use the Cooper River, but less information is available on this recently listed species. Data show that adult Atlantic sturgeon use estuarine and marine environments as primary habitat and migrate up rivers to spawn. This migration occurs as early as February in southern systems such as the Cooper River, but migrations on this river are blocked by the Pinopolis Dam. Although researchers have captured three juvenile Atlantic sturgeon in the Cooper River, there is no evidence to suggest these individuals were spawned there. Researchers believe it is more likely these juveniles were spawned in other rivers and moved to the Cooper River during flood conditions or for feeding opportunities.[5]

We believe the project may affect, but is not likely to adversely affect shortnose sturgeon and Atlantic sturgeon. We identified the following potential effects. Protected sturgeons may be injured by construction activities (such as being impacted by a construction barge or pile placement), though we believe this risk is discountable due to the species' mobility and the in-water work moratorium which will limit the in-water work window to the period of time when sturgeons are not likely to be present (i.e., April 1 – September 30). Noise created during pile installation could affect protected sturgeons through behavioral changes or through physical injury. The sound propagation analysis provided by the Navy and verified by NMFS (see Appendix A), indicates that the majority of noise from pile installation (installation of concrete pilings) will only reach a level loud enough to cause injurious effects at distances up to 43 m and behavioral effects at distances up to approximately 215 m. Because the river is approximately 400 m in width, a corridor (without noise loud enough to cause behavioral effects) along the opposite river bank will remain available for passage during the majority of the construction activity. However, the installation of steel pilings produces far more sound, and could have injurious effects at distances up to 1,477 m and behavioral effects up to 7,356 m (sound will not extend the full distance based on the morphology of the river), but these effects would be temporary as the driving of the steel piles is only expected to occur over 9 days between June 15th and August 30th. NMFS believes the effects of noise generated from pile installation will be discountable to shortnose and Atlantic sturgeons because, based on their life history strategies and migration patterns, these fish are unlikely to be present in the

---

[2] Intermediate salinity

[3] Duncan, M.S., J.J. Isely, and D.W. Cooke. 2004. Evaluation of shortnose sturegeon spawning in the Pinopolis Dam Tailrace, South Carolina. North American Journal of Fisheries Management 24:932-938.

[4] Palmer, A.G. 2001. Seasonal, diel, and tidal movements of shortnose sturgeon (*Acipenser brevirostrum*) in the Cooper River, South Carolina. M.S. Thesis. University of Charleston, Charleston, South Carolina. 57pp.

[5] McCord, J. W. 2004. ASMFC Atlantic Sturgeon Plan – amendment 1 South Carolina annual report for calendar-year 2003. Compliance report submitted to Atlantic States Marine Fisheries Commission, October 19, 2004. Washington, DC.

project area when piling installation will occur (May 1st – September 30th). Telemetry data of tagged sturgeon in the Cooper River provides further evidence that both Atlantic and shortnose sturgeons are unlikely to be present in the action area at times of piling installation (Bill Post, South Carolina Department of Natural Resources, pers. comm.).

Bottlenose dolphins, protected by the Marine Mammal Protection Act, may also be present in the action area of this project and thus may be affected by project activities. We recommend that the Navy contact the Marine Mammal Permits and Authorizations Office for guidance on protecting marine mammals during pile driving activities associated with the expansion of Pier X-Ray North. They can be reached at (301) 427-8401.

This concludes your consultation responsibilities under the ESA for species under NMFS' purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action.

We have enclosed other relevant information for your review. If you have any questions, please contact Adam Brame, consultation biologist, at (727) 209-5958 or by e-mail at Adam.Brame@noaa.gov. Thank you for your continued cooperation in the conservation of listed species.

Sincerely,

Miles M. Croom

for Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.g
Ref: I/SER/2012/01543

Appendix A: Noise Thresholds and Calculations

The Navy provided underwater injury and behavioral thresholds for various sizes of fish based on the most currently accepted criteria for fish.[6] When source levels are greater than the thresholds, there are impacts to the organisms and we can calculate the distances necessary for sound to become reduced below threshold levels. Since the expected source levels are all above the reported thresholds, the Navy calculated the distances to which impacts would occur (see below) using a "15 log R" equation. The Navy calculated these distances for impacts relating to the driving of both 24-inch square concrete piles and 30-inch cylindrical steel piles, though we only reproduce the results here for the prior.

Threshold noise levels for fish and sea turtles.

Impact	Organism	Underwater threshold
Injury	All fish	206 dB peak
	Fish ≥ 2 grams	187 dB (SEL)
	Fish < 2 grams	183 (SEL)
Behavior	Fish	150 dB (RMS)

The Protected Resources Division of the National Marine Fisheries Service verified the noise propagation analysis provided by the U.S. Department of the Navy as described below.

Definitions

Peak Pressure: Peak pressure is the maximum positive pressure between zero and the greatest pressure of signals in units of dB re 1 μPa_{peak} or $_{0\text{-}peak}$. Peak levels are generally higher than RMS levels and often used to determine injury ranges from pressure.

Sound Exposure Level (SEL): SEL is the time cumulative sum of squares pressure divided by the duration of the sound (usually 1 second for a pile driving strike). SEL levels have units of dB re 1 $\mu Pa^2 \cdot s$ and can be used to calculate the cumulative risk to multiple exposures over time from repeated pile driving strikes.

Root Mean Square (RMS): The square root of the average of the square of the pressure of the sound signal over a given duration in units of dB re 1 μPa_{rms}. Often used to determine behavioral responses to audible sounds.

The source sound levels provided by the Navy for the pile-driving of 24-inch square concrete and 30-inch cylindrical steel piles are referenced from a compendium of pile driving data. Since the data referenced the sound level at 10 m, rather than at the source, we conducted a back calculation to the source by determining the decibel loss over the 10 m using the following steps:

- The dB loss over 10 m was determined using the 15 log R spreading loss equation with our in-house calculator.
- We calculated a 15 dB attenuation loss
- An attenuation loss of 15 dB was added to each referenced noise level to determine the source level for each dB unit of measurement.

[6] Federal Highway Administration. 2012. *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish.* Final. February. (ICF 645.10.) Prepared by ICF International, Seattle, WA.

Steps to determine the source level of a 24-inch concrete pile.

Reference Unit (dB)	Reference Level[a]	Sound loss over 10 meters	Source Level used for analysis
Peak pressure	185 dB	15 dB	200 dB
RMS	170 dB	15 dB	185 dB
SEL_{SS}	160 dB	15 dB	175 dB
SEL_{CUM}			207.55

[a]Pile driving data from Illinworth and Rodkin (2007)

To address the sound exposure level over the course of a day, the SEL from exposure to a single pile strike (SEL_{SS}) was converted to the SEL for exposure to the total pile strikes each day (SEL_{CUM}). This calculated by the following:

$SEL_{CUM} = SEL_{SS} + 10 \log(\text{total pile strike per day})$
$SEL_{CUM} = 175 + 10 \log(1800)$
$SEL_{CUM} = 175 + 32.55$
$SEL_{CUM} = 207.55$ dB

Table of cumulative exposure to sound over one day. This is a conservative approach to determining the SEL during pile driving activities since it assumes the animal will not move from the area and will remain exposed to pile driving for the maximum duration each day.

SELss	Number Strikes/Pile	Number of Piles/Day	SEL_{CUM}
175 dB	450	4	207.55 dB

NMFS verified the distance calculations provided by the Navy using our in-house spreading loss calculator. As an example, to determine the distance from the source that could cause behavioral effects to fish we subtracted the threshold (150 dB) from the source (185 dB) and used the calculator to determine the distance needed for sound to reduce to that value (35 dB). From the table below, at a range of 215 meters, the 15 log R spreading loss is 34.99 dB. This same calculation was conducted for each of the other threshold levels to verify the distances calculated by the Navy.

Spherical (20 logR) and Cylindrical (10 and 15 logR) Spreading Loss

Instructions: Input range from source to obtain spherical and cylindrical spreading loss (- dB)

Range (m)	log (R)	20 logR Spherical Spreading Loss (- dB)	10 log R Cylindrical Spreading Loss (- dB)	15 log R Cylindrical Spreading Loss (- dB)
1	0	0	0	0
2	0.301029996	6.020599913	3.010299957	4.515449935
4	0.602059991	12.04119983	6.020599913	9.03089987
8	0.903089987	18.06179974	9.03089987	13.5463498
10	1	20	10	15
25	1.397940009	27.95880017	13.97940009	20.96910013
50	1.698970004	33.97940009	16.98970004	25.48455007
100	2	40	20	30
215	2.33243846	46.6487692	23.3243846	34.9865769
2000	3.301029996	66.02059991	33.01029996	49.51544993
10000	4	80	40	60
100000	5	100	50	75
500000	5.698970004	113.9794001	56.98970004	85.48455007
1000000	6	120	60	90

COMMENTS ON THE FONSI/FONPA

DEPARTMENT OF THE ARMY
CHARLESTON DISTRICT, CORPS OF ENGINEERS
69-A HAGOOD AVENUE
CHARLESTON, SOUTH CAROLINA 29403-5107

REPLY TO
ATTENTION OF

CESAC-RD

JUN 1

MEMORANDUM FOR Commanding Officer, Naval Facilities Command Southeast, (Mr. Tom Currin/NAVFAC SE (EV21)), Post Office Box 30A, Jacksonville, Florida 32212-0030

SUBJECT: Draft Finding of No Significant Impact/Finding of No Practicable Alternative for the Facilities Expansion at the Nuclear Power Training Unit Charleston, Joint Base Charleston, Berkeley County, South Carolina

1. This is in response to your letter dated 2 May 2012, regarding a Draft Finding of No Significant Impact and Finding of No Practicable Alternative (Draft FONSI/FONPA), and a Revised Draft Environmental Assessment (Revised Draft EA) to assess the impacts of infrastructure improvements and expansion at the Nuclear Power Training Unit- Charleston (NPTU Charleston). The U.S. Army Corps of Engineers is not providing comments on the Draft FONSI/FONPA because it does not meet our needs as described below in #3 and #4.

2. According to the Revised Draft EA, the proposed project will include the placement of fill material, modifications to an existing pier, relocation of an existing security barrier, and may require additional dredging in waters of the U.S. Therefore, a Department of the Army (DA) permit, pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, will be required for the proposed project.

3. NPTU Charleston is currently conducting some improvements to the existing upland facilities, such as increasing the overall number of parking spaces. It is our understanding that NPTU Charleston will submit an application for a DA permit once the EA for the proposed project has been completed and the necessary funding has been secured.

4. The Revised Draft EA includes new information about additional impacts (temporary vessel stabilization piles and alternate power supply lines) that were not discussed in the Draft EA. As stated in our previous letter dated 9 April 2012, we anticipate that the size, configuration, and potential impacts to waters of the United States associated with the proposed project will change during the development of final design drawings. Once you are ready to submit an application for a DA permit, please contact this office to schedule a pre-application meeting.

5. The Corps appreciates this opportunity to review the Revised Draft EA, and we look forward to working with you to evaluate the proposed project once you are further along in the design process. If you have any questions about our comments, please do not hesitate to contact our project manager Mr. Nathaniel I. Ball at 843-329-8047.

EDWARD P. CHAMBERLAYNE, P.E.
LTC, EN
Commanding

APPENDIX B

AIR QUALITY EMISSIONS CALCULATIONS

PROPOSED ACTION: CRITERIA POLLUTANT SUMMARY

2015 Estimated Criteria Pollutant Emissions	Emission (tons/year)					
	CO	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**
North Finger Pier Demolition	0.38	0.12	0.86	0.00	0.01	0.03
North Pier Extension Construction	4.11	1.26	9.56	0.01	0.39	0.34
Facilities, Security, and Parking Upgrades	3.00	0.85	6.93	0.01	0.42	0.37
Demolition and Construction Truck Trips	0.68	0.18	1.11	0.00	0.06	0.05
Construction Worker Commute	0.78	0.06	0.06	0.00	0.01	0.01
Personnel Commuting (Annual starting in 2015)	12.82	1.04	0.99	0.02	0.16	0.09
TOTAL =	**21.76**	**3.51**	**19.51**	**0.04**	**1.05**	**0.89**

PROPOSED ACTION: GHG EMISSIONS SUMMARY

2015 Estimated GHG Emissions	Emissions (Metric tons/year)			
	CO_2	CH_4	N_20	CO_{2e}
North Finger Pier Demolition	73.95	0.01	0.00	74.40
North Pier Extension Construction	217.57	0.02	0.00	218.67
Facilities, Security, and Parking Upgrades	832.82	0.10	0.66	1038.86
Demolition and Construction Truck Trips	155.76	0.01	0.10	185.43
Construction Worker Commute	108.85	0.01	0.01	110.79
Personnel Commuting (Annual starting in 2015)	1560.80	0.11	0.09	1590.82
TOTAL =	**2949.74**	**0.24**	**0.85**	**3218.97**

Notes:

$CO_{2e} = (CO_2*1)+ (CH_4*21)+(N_2O*310)$

N_20 = NOx * 0.095

	CO_{2e}
Proposed Construction Emissions as a % of 2011 U.S. Emissions =	0.0000485%

North Finger Pier Demolition: Criteria Pollutant Emissions

			Emission Factors								Emissions						Total Emissions (Tons/yr)					
Equipment	FUEL	HP	CO (lb/hr)	VOC (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM10 (lb/hr)	No of Equipment	Hours Per Day	Days in Service	CO lbs/day	VOC lbs/day	NOX lbs/day	SOX lbs/day	PM10 lbs/day	PM2.5 lbs/day	CO	VOC	NOX	SOX	PM10	PM2.5
Barge-Mounted Excavator	DIESEL	320	0.549	0.181	1.611	0.00229	0.057	1	8	30	4.39	1.44	12.89	0.02	0.46	0.41	0.066	0.022	0.193	0.000	0.007	0.006
Generator	DIESEL	45	0.273	0.096	0.297	0.00040	0.025	2	8	30	4.37	1.53	4.75	0.01	0.41	0.36	0.066	0.023	0.071	0.000	0.006	0.005
20-Ton Forklift	DIESEL	130	0.727	0.144	1.120	0.00141	0.065	1	8	30	5.81	1.16	8.96	0.01	0.52	0.46	0.087	0.017	0.134	0.000	0.008	0.007
Wheeled Loader	DIESEL	250	0.384	0.133	1.313	0.00168	0.046	1	8	30	3.07	1.06	10.50	0.01	0.37	0.33	0.046	0.016	0.158	0.000	0.006	0.005
Air Compressor	DIESEL	50	0.265	0.101	0.231	0.00030	0.024	2	8	30	4.23	1.62	3.70	0.00	0.38	0.34	0.064	0.024	0.055	0.000	0.006	0.005
Concrete Saws	DIESEL	10	0.068	0.020	0.126	0.00021	0.005	4	8	30	2.17	0.64	4.03	0.01	0.16	0.14	0.033	0.010	0.061	0.000	0.002	0.002
TOTAL									**TOTAL:**		**24.06**	**7.45**	**44.83**	**0.06**	**2.30**	**2.05**	**0.36**	**0.11**	**0.67**	**0.00**	**0.03**	**0.03**

															Hourly Emission Rates (lb/hr)					Annual Emission Rates (ton/yr)				
Equipment Type	power rating	Load %	No. of units	Fuel Type	hrs /day	Days/year	hrs/year	Fuel Consumption (g/kW-hr)	PM10	NOx	CO	SO2	VOC	Emission factor units	CO	VOC	NOx	SO2	PM10	CO	VOC	NOx	SO2	PM10
Work Boat	75	85.0%	1	Diesel	4	15	60	222.33	0.26	10.61	0.99	0.01	0.09	g/kW-hr	0.16	0.01	1.74	0.00	0.04	0.0	0.0	0.1	0.0	0.0
Tugboats	186	85.0%	1	Diesel	4	15	60	222.33	0.26	10.61	0.99	0.01	0.99	g/kW-hr	0.41	0.41	4.36	0.00	0.11	0.0	0.0	0.1	0.0	0.0
														TOTAL:	**0.57**	**0.42**	**6.10**	**0.01**	**0.15**	**0.02**	**0.01**	**0.18**	**0.00**	**0.00**

North Finger Pier Demolition: GHG Emissions

			Emission Factors							Emissions			Total Emissions (Metric		
Equipment	FUEL	HP	CO2 (lb/hr)	CH4 (lb/hr)	NOX (lb/hr)	N2O (lb/hr)	No of Equipment	Hours Per Day	Days in Service	CO2 lbs/day	CH4 lbs/day	N2O lbs/day	CO2	CH4	N2O
Barge-Mounted Excavato	DIESEL	320	233.7	0.016	1.611	0.00229	1	8	30	1869.88	0.13	0.02	25.445	0.002	0.000
Generator	DIESEL	45	30.6	0.009	0.297	0.00040	2	8	30	489.97	0.14	0.01	6.667	0.002	0.000
20-Ton Forklift	DIESEL	130	124.9	0.013	1.120	0.00141	1	8	30	999.20	0.10	0.01	13.597	0.001	0.000
Wheeled Loader	DIESEL	250	149.0	0.012	1.313	0.00168	1	8	30	1191.81	0.10	0.01	16.218	0.001	0.000
Air Compressor	DIESEL	50	22.3	0.009	0.231	0.00030	2	8	30	356.34	0.15	0.00	4.849	0.002	0.000
Concrete Saws	DIESEL	10	16.5	0.002	0.126	0.00021	4	8	30	527.29	0.06	0.01	7.175	0.001	0.000
TOTAL								**TOTAL:**		**5434.49**	**0.67**	**0.06**	**73.952**	**0.01**	**0.00**

North Pier Extension Construction: Criteria Pollutant Emissions

Equipment	FUEL	HP	CO (lb/hr)	VOC (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM10 (lb/hr)	No of Equipment	Hours Per Day	Days in Service	CO lbs/day	VOC lbs/day	NOX lbs/day	SOX lbs/day	PM10 lbs/day	PM2.5 lbs/day	CO	VOC	NOX	SOX	PM10	PM2.5
Emission Factors											Emissions						Total Emissions (Metric Tons)					
Barge Crane - 150 Ton	DIESEL	250	0.529	0.155	1.423	0.00177	0.052	1	8	90	4.23	1.24	11.38	0.01	0.41	0.37	0.191	0.056	0.512	0.001	0.019	0.017
Impact Hammer	DIESEL	250	0.523	0.145	1.519	0.00250	0.049	4	8	90	16.75	4.65	48.60	0.08	1.57	1.40	0.754	0.209	2.187	0.004	0.071	0.063
Vibratory Hammer	DIESEL	250	0.523	0.145	1.519	0.00250	0.049	4	8	90	16.75	4.65	48.60	0.08	1.57	1.40	0.754	0.209	2.187	0.004	0.071	0.063
20-Ton Forklift	DIESEL	130	0.726	0.135	1.045	0.00141	0.059	2	8	90	11.61	2.16	16.72	0.02	0.95	0.84	0.522	0.097	0.752	0.001	0.043	0.038
Wheeled Loader	DIESEL	250	0.368	0.126	1.212	0.00168	0.042	1	8	90	2.95	1.01	9.70	0.01	0.33	0.30	0.133	0.045	0.436	0.001	0.015	0.013
Air Compressor	DIESEL	50	0.255	0.092	0.222	0.00029	0.022	4	8	90	8.15	2.95	7.11	0.01	0.70	0.63	0.367	0.133	0.320	0.000	0.032	0.028
Generator	DIESEL	33	0.264	0.087	0.285	0.00040	0.023	4	8	90	8.44	2.79	9.11	0.01	0.75	0.67	0.380	0.126	0.410	0.001	0.034	0.030
Welders	DIESEL	45	0.275	0.098	0.253	0.00034	0.024	4	8	90	8.81	3.13	8.11	0.01	0.77	0.68	0.396	0.141	0.365	0.000	0.035	0.031
Concrete Truck	DIESEL	210	0.384	0.140	1.237	0.00187	0.041	2	8	90	6.14	2.24	19.80	0.03	0.66	0.59	0.276	0.101	0.891	0.001	0.030	0.026
Concrete Pump Truck	DIESEL	210	0.384	0.140	1.237	0.00187	0.041	2	8	90	6.14	2.24	19.80	0.03	0.66	0.59	0.276	0.101	0.891	0.001	0.030	0.026
									TOTAL:		**89.97**	**27.05**	**198.92**	**0.30**	**8.38**	**7.46**	**4.05**	**1.22**	**8.95**	**0.01**	**0.38**	**0.34**

Equipment Type	power rating	Load %	No. of units	Fuel Type	hrs /day	Days/year	hrs/ year	Fuel Consumption (g/kW-	PM10	NOx	CO	SO2	VOC	Emission factor units	CO	VOC	NOx	SO2	PM10	CO	VOC	NOx	SO2	PM10
															Hourly Emission Rates (lb/hr)					Annual Emission Rates (ton/yr)				
Work Boat	75	85.0%	1	Diesel	4	50	200	222.33	0.26	10.61	0.99	0.01	0.09	g/kW-hr	0.16	0.01	1.74	0.00	0.04	0.0	0.0	0.2	0.0	0.0
Tugboats	186	85.0%	1	Diesel	4	50	200	222.33	0.26	10.61	0.99	0.01	0.99	g/kW-hr	0.41	0.41	4.36	0.00	0.11	0.0	0.0	0.4	0.0	0.0
													TOTAL:		**0.57**	**0.42**	**6.10**	**0.01**	**0.15**	**0.06**	**0.04**	**0.61**	**0.00**	**0.01**

North Pier Extension Construction: GHG Emissions

Equipment	FUEL	HP	CO2 (lb/hr)	CH4 (lb/hr)	NOX (lb/hr)	N2O (lb/hr)	No of Equipment	Hours Per Day	Days in Service	CO2 lbs/day	CH4 lbs/day	N2O lbs/day	CO2	CH4	N2O
Emission Factors										Emissions			Total Emissions (Metric		
Barge Crane - 150 Ton	DIESEL	250	112.2	0.009	1.423	0.00177	1	8	90	897.27	0.08	0.01	36.630	0.003	0.001
Impact Hammer	DIESEL	250	254.2	0.013	1.519	0.00250	4	8	90	8135.63	0.42	0.08	332.127	0.017	0.003
Vibratory Hammer	DIESEL	250	254.2	0.013	1.519	0.00250	4	8	90	8135.63	0.42	0.08	332.127	0.017	0.003
20-Ton Forklift	DIESEL	130	149.0	0.011	1.045	0.00141	2	8	90	2383.63	0.18	0.02	97.309	0.007	0.001
Wheeled Loader	DIESEL	250	30.6	0.008	1.212	0.00168	1	8	90	244.98	0.06	0.01	10.001	0.003	0.001
Air Compressor	DIESEL	50	22.3	0.008	0.222	0.00029	4	8	90	712.68	0.27	0.01	29.094	0.011	0.000
Generator	DIESEL	33	30.6	0.008	0.285	0.00040	4	8	90	979.94	0.25	0.01	40.005	0.010	0.001
Welders	DIESEL	45	26.0	0.009	0.253	0.00034	4	8	90	830.66	0.28	0.01	33.911	0.012	0.000
Concrete Truck	DIESEL	210	166.5	0.013	1.237	0.00187	2	8	90	2664.73	0.20	0.03	108.784	0.008	0.001
Concrete Pump Truck	DIESEL	210	166.5	0.013	1.237	0.00187	2	8	90	2664.73	0.20	0.03	108.784	0.008	0.001
								TOTAL:		**5329.45**	**0.40**	**0.06**	**217.57**	**0.02**	**0.00**

Heavy Equipment Emissions: Facilities, Security, and Parking Upgrades: Criteria Pollutant Emissions

Note: Construction duration in 2015 is assumed to be 12 months total.

	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr						No of Equipment	Hrs/day	Months	Emissions, lbs/day						Emissions, tons/year					
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5				CO	VOC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx	PM10	PM2.5
Tractor/Loader/Backhoe	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.58206	2	4	12	4.26	1.25	7.50	0.01	0.69	0.61	0.67	0.19	1.17	0.00	0.11	0.10
Dump Truck	Diesel	479	57	1.82	0.57	5.55	0.006	0.295	0.26255	2	4	6	8.76	2.74	26.73	0.03	1.42	1.26	0.68	0.21	2.08	0.00	0.11	0.10
Water Truck	Diesel	250	50	1.82	0.57	5.55	0.006	0.295	0.26255	1	4	12	2.01	0.63	6.12	0.01	0.33	0.29	0.31	0.10	0.95	0.00	0.05	0.05
Bulldozers	Diesel	357	59	4.25	0.83	7.51	0.006	0.32	0.2848	2	4	3	15.79	3.08	27.90	0.02	1.19	1.06	0.62	0.12	1.09	0.00	0.05	0.04
Crane	Diesel	399	43	2.44	0.63	6.27	0.006	0.243	0.21627	1	2	6	1.85	0.48	4.74	0.00	0.18	0.16	0.14	0.04	0.37	0.00	0.01	0.01
Excavator	Diesel	168	57	2.19	0.59	6.15	0.006	0.229	0.20381	1	4	4	1.85	0.50	5.19	0.01	0.19	0.17	0.10	0.03	0.27	0.00	0.01	0.01
Compactor	Diesel	8	43	3.47	0.68	4.33	0.009	0.274	0.24386	1	2	6	0.05	0.01	0.07	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Compressor	Diesel	106	48	4.08	1.32	7.76	0.007	0.686	0.61054	1	4	10	1.83	0.59	3.48	0.00	0.31	0.27	0.24	0.08	0.45	0.00	0.04	0.04
Paver	Diesel	100	62	4.4	1.5	8.75	0.007	0.759	0.67551	1	4	6	2.41	0.82	4.78	0.00	0.41	0.37	0.19	0.06	0.37	0.00	0.03	0.03
Concrete Truck/Pump Truck	Diesel	210	20	1.82	0.57	5.55	0.006	0.295	0.26255	1	4	6	0.67	0.21	2.06	0.00	0.11	0.10	0.05	0.02	0.16	0.00	0.01	0.01
												TOTAL =	**39.48**	**10.31**	**88.57**	**0.08**	**4.83**	**4.30**	**3.00**	**0.85**	**6.93**	**0.01**	**0.42**	**0.37**

Heavy Equipment Emissions: Facilities, Security, and Parking Upgrades: GHG Emissions

	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr		No of Equipment	Hrs/day	Months	Emissions, lbs/day		Emissions, metric tons/year	
Equipment				**CO2**	**CH4**				**CO2**	**CH4**	**CO2**	**CH4**
Tractor/Loader/Backhoe	Diesel	108	55	568.3	0.108	2	4	12	595.38	0.11	92.88	0.02
Dump Truck	Diesel	479	57	568.3	0.051	2	4	12	2736.62	0.25	426.91	0.04
Water Truck	Diesel	250	50	568.3	0.051	1	4	12	626.45	0.06	97.73	0.01
Bulldozers	Diesel	357	59	568.3	0.075	2	4	3	2111.18	0.28	82.34	0.01
Crane	Diesel	399	43	568.3	0.053	1	2	6	429.92	0.04	33.53	0.00
Excavator	Diesel	168	57	568.3	0.053	1	4	4	479.91	0.04	24.96	0.00
Compactor	Diesel	8	43	568.3	0.061	1	2	6	8.62	0.00	0.67	0.00
Compressor	Diesel	106	48	568.3	0.119	1	4	10	254.99	0.05	33.15	0.01
Paver	Diesel	100	62	568.3	0.135	1	4	6	310.72	0.07	24.24	0.01
Concrete Truck/Pump Truc	Diesel	210	20	568.3	0.051	1	4	6	210.49	0.02	16.42	0.00
								TOTAL:	**7764.26**	**0.93**	**832.82**	**0.10**

Demolition and Construction Truck Trips: Criteria Pollutant Emissions

	Vehicle Class	Total No. of Vehicle	Speed (mph)	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	PM10 Tire Wear (g/mi)	PM10 Brake Wear (g/mi)	PM2.5 Running Exhaust (g/mi)	PM2.5 Tire Wear (g/mi)	PM2.5 Brake Wear (g/mi)
Transport Trucks	Heavy-duty truck, diesel	2000	15	30	10.283	16.708	2.649	0.024	0.841	0.035	0.028	0.796	0.009	0.012

	Emissions, lbs/day						Emissions, tons per year					
	CO	NOx	VOCs	SOx	PM10	PM2.5	CO	NOx	VOCs	SOx	PM10	PM2.5
Transport Trucks	7.56	12.28	1.95	0.02	0.66	0.60	0.68	1.11	0.18	0.00	0.06	0.05
TOTAL	**7.56**	**12.28**	**1.95**	**0.02**	**0.66**	**0.60**	**0.68**	**1.11**	**0.18**	**0.00**	**0.06**	**0.05**

ASSUMPTIONS:

* Assuming 40 miles round trip per vehicle
* Total truck trips for demolition & Construction - 2,000 trips

Demolition and Construction Truck Trips: GHG Emissions

	Vehicle Class	Total No. of Vehicle	Speed (mph)	VMT (mi/vehicle-day)	CO2 Running Exhaust	CH4 Running Exhaust	NOx Running Exhaust	N2O Running Exhaust	Emissions, lbs/day			Emissions, metric tons per year		
									CO2	CH4	N2O	CO2	CH4	N2O
Transport Trucks	Heavy-duty truck, diesel	2000	15	30	2595.96	0.114	16.708	1.587	1907.71	0.08	1.17	**155.76**	**0.01**	**0.10**

Construction Worker Commute Emission: Criteria Pollutant Emissions

Vehicle Class	No. of Workers	Speed (mph)	VMT (mi/vehicle-day)	CO		NO_X		VOCs						SOx		PM10				PM2.5			
				Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g'mi)	Start-Up (g/start)	Hot-Soak (g/trip)	Resting Loss (g/hr)	Running Evaporative (g/mi)	Diurnal Evaporative (g/hr)	Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Start-Up (g/start)	Tire Wear (g/mi)	Brake Wear (g/mi)
Light Duty Auto	35	35	30	2.072	8.006	0.184	0.414	0.058	0.694	0.232	0.035	0.039	0.084	0.003	0.002	0.011	0.015	0.008	0.013	0.011	0.014	0.002	0.005

Vehicle Class	Days	Emissions, lbs/day						Emissions, tons per year					
		CO	NOx	VOCs	SOx	PM10	PM2.5	CO	NOx	VOCs	SOx	PM10	PM2.5
Light Duty Auto	260	6.03	0.49	0.47	0.01	0.08	0.04	**0.78**	**0.06**	**0.06**	**0.00**	**0.01**	**0.01**

Construction Worker Commute Emission: GHG Emissions

Vehicle Class	No. of Workers	Speed (mph)	VMT (mi/vehicle-day)	CO2		CH4		NO_X		N2O		Emissions, lbs/day			Days	Emissions, metric tons per year		
				Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)	CO2	CH4	N2O		CO2	CH4	N2O
Light Duty Auto	35	35	30	385.21	202.414	0.02	0.035	0.197	0.429	0.019	0.041	922.95	0.05	0.05	260	108.85	0.01	0.01

Annual Student/Staff Commute Emission (Starting in 2015): Criteria Pollutant Emissions

Vehicle Class	No. of Add. Commuters	Speed (mph)	VMT (mi/vehicle-day)	CO		NO_X		VOCs						SOx		PM10				PM2.5			
				Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g'mi)	Start-Up (g/start)	Hot-Soak (g/trip)	Resting Loss (g/hr)	Running Evaporative (g/mi)	Diurnal Evaporative (g/hr)	Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Start-Up (g/start)	Tire Wear (g/mi)	Brake Wear (g/mi)
Light Duty Auto	572	35	30	2.072	8.006	0.184	0.414	0.058	0.694	0.232	0.035	0.039	0.084	0.003	0.002	0.011	0.015	0.008	0.013	0.011	0.014	0.002	0.005

Vehicle Class	Days	Emissions, lbs/day						Annual Emissions, tons per year					
		CO	NOx	VOCs	SOx	PM10	PM2.5	CO	NOx	VOCs	SOx	PM10	PM2.5
Light Duty Auto	260	98.58	8.01	7.65	0.12	1.25	0.72	**12.82**	**1.04**	**0.99**	**0.02**	**0.16**	**0.09**

Annual Student/Staff Commute Emission (Starting in 2015): GHG Emissions

Vehicle Class	No. of Add. Commuters	Speed (mph)	VMT (mi/vehicle-day)	CO2		CH4		NO_X		N2O		Emissions, lbs/day			Days	Annual Emissions, metric tons per year		
				Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)	CO2	CH4	N2O		CO2	CH4	N2O
Light Duty Auto	572	35	30	338.923	163.505	0.021	0.04	0.184	0.414	0.01748	0.0393	13234.35	0.90	0.76	260	**1560.80**	**0.11**	**0.09**

APPENDIX C

COASTAL CONSISTENCY DETERMINATION

DHEC

PROMOTE PROTECT PROSPER

Catherine B. Templeton, Director

Promoting and protecting the health of the public and the environment

April 23, 2012

Mr. C. R. Destafney, PE
Department of the Navy
Naval Facilities Engineering Command Southeast
Jacksonville, FL 32212-0030

Re: Federal Consistency for facility expansion -- Nuclear Power Training Unit (NPTU), Joint Base Charleston

Dear Mr. Destafney:

This is in response to the March 8, 2012, request for Federal Consistency certification for the expansion of the existing Nuclear Power Training Unit (NPTU) at Joint Base Charleston on and adjacent to the Cooper River, in Berkeley County, S. C.

The consistency request is for infrastructure improvements to better facilitate student training on moored training ships. The infrastructure improvements include the construction of two support buildings, an expansion of Pier X-Ray North, the addition of 1,900 parking spaces, upgrade utilities and its infrastructure, the construction of a security welcome station, construction of a new security tower on Pier X-Ray North, replacing security fencing and moving security barriers. Work will also require the demolition of a 2500 sq. ft. storage and handling facility and parking spaces. The work will result in the permanent alteration of 6.5 acres of palustrine forested wetlands and .5 acres of emergent tidal wetlands.

After a review of the Transportation Facilities *(parking facilities)*, Marine Related Facilities *(docks)*, and Activities in Areas of Special Resource Significance (*wetlands and navigation channels*) policies and Mitigation Guidleines contained within South Carolina's Coastal Zone Management Program (CZMP), Coastal Zone Consistency (CZC) staff has determined the requested work is consistent with the CZMP to the maximum extent practible as required by 15 CFR § 930, Subpart C provided that wetland impacts are properly mitigated in accordance with U. S. Army Corps of Engineers wetland mitigation standards. The current proposed mitigation plan (Currin email dated April 20, 2012) consists of purchasing 70 credits (10 credits per acre) from the Pigeon Pond Mitigation Bank. Proof of credit purchase must be submitted to CZC staff at the address below when the purchase is finalized.

Please do not hesitiate to contact me at 843-953-0205 or joynercm@dhec.sc.gov should you have any questions.

Sincerely,

Curtis M. Joyner
Manager, Coastal Zone Consistency Section
Regulatory Division
DHEC OCRM

Cc: Rheta DiNovo, DHEC OCRM
Thomas Currin NAVFAC SE

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/146
February 21, 2012

Ms. Rheta Dinovo
Director, Regulatory Programs Division
SCDHEC Ocean and Coastal Resource Management
1362 McMillan Avenue, Suite 400
Charleston, SC 29405

Dear Ms. Dinovo:

SUBJECT: COASTAL CONSISTENCY DETERMINATION FOR THE PROPOSED FOR FACILITIES EXPANSION TO SUPPORT NUCLEAR POWER TRAINING UNIT (NPTU) CHARLESTON AT JOINT BASE CHARLESTON, SOUTH CAROLINA

As the lead agency, the Department of the Navy (Navy), in cooperation with the Department of the Air Force (Air Force) as a cooperating agency, is preparing an Environmental Assessment (EA) to assess the impacts of the proposed facilities expansion at Nuclear Power Training Unit (NPTU) Charleston on Joint Base Charleston, SC (JB-CHS). In accordance with the Coastal Zone Management Act (CZMA) and 15 CFR 930, the Navy has prepared a Coastal Consistency Determination and is requesting coordination with the South Carolina Department of Health and Environmental Control, Ocean and Coastal Resource Management Office concerning the potential affects to South Carolina Coastal Management Program within the project area. See enclosures (1) and (2) for project description and vicinity map of NPTU Charleston.

NPTU Charleston's mission is to provide prospective naval nuclear propulsion plant operators and officers with training and certification in the actual hands-on operation of a nuclear propulsion plant. The proposed action would expand and upgrade NPTU Charleston's academic, administrative, and training facilities to alleviate current overcrowding, accommodate increased student throughput and associated increase in NPTU staff, provide facilities for transitioning to newer Moored Training Ships, allow for uninterrupted student training during the transition, and ensure all facilities meet applicable security requirements.

Based on the information and analysis presented in the EA and the South Carolina Coastal Management Program Consistency Review, the Navy has concluded that the proposed action will be undertaken in a manner consistent, to the maximum extent practicable, with the enforceable policies of the federally approved South Carolina Coastal Management Program. See enclosures (3), (4) and (5) for location of construction elements of Alternative 1 (Preferred Alternate), location of Wetlands and Floodplains Associated with Alternatives 1-5, and Federal Consistency Analysis.

In accordance with 15 CFR 930.36, the Navy requests concurrence with this determination. Please provide your response within 60 days of receiving this letter.

If you need any further additional information or have questions regarding this letter, please feel free to contact Mr. Thomas A. Currin at commercial: (904) 542-6301 or by email: thomas.currin@navy.mil.

Thank you for your time, consideration and assistance regarding this matter.

Sincerely,

Cole Destaf

C. R. DESTAFNEY, PE
Environmental Business Line Coordinator
By direction of the Commanding Officer

Enclosures:
1. Project Description
2. Figure 1. Vicinity Map of NPTU Charleston
3. Figure 2. Location of Construction Elements of the Preferred Alternative
4. Location of Wetlands and Floodplains Associated with Alternatives 1-5
5. Federal Consistency Analysis

Enclosure 1
Project Description

The Departments of the Navy (Navy) and the Air Force (a cooperating agency) are submitting this Consistency Determination under Coastal Zone Management Act 16 U.S.C. § 1451 *et seq*. and its implementing regulations at 15 C.F.R. Part 930.39, for Expansion of the Naval Nuclear Propulsion Training Unit Charleston, South Carolina.

Proposed Action: The Navy proposes to provide infrastructure improvements needed to accommodate current and anticipated increased student numbers at the Nuclear Power Training Unit – Charleston (NPTU Charleston), Joint Base Charleston (JB CHS), South Carolina (see Enclosure 1). NPTU Charleston proposes to alleviate current overcrowding, accommodate increased student throughput (with associated increase in NPTU staff), provide facilities for transitioning to newer moored training ships (MTSs), allow for uninterrupted student training during MTS transition, and ensure that all facilities meet Department of Defense, Navy, and Air Force security requirements. To accomplish this, the Proposed Action would: demolish, renovate, and upgrade existing facilities and infrastructure; construct academic and training facilities; relocate MTS support systems; increase the number of parking spaces; expand pier facilities to support uninterrupted MTS operation and training during transition to newer MTSs; and implement improved security and access measures.

Purpose and Need: The purpose of the proposed action is to provide infrastructure to support the increase in student throughput and the newer MTS design. This action will be accomplished by increasing the number of training classrooms and office spaces; providing space for training system upgrades and new IDE simulators; consolidating MTS support systems (currently provided on multiple, specially configured barges) in an on-shore facility; providing increased pier-side MTS berthing to accommodate newer MTSs and to allow the transition to the newer MTSs without impacting training; and providing an increase and replacement of parking areas.
The need for the proposed action is to ensure that NPTU Charleston's mission of providing highly qualified nuclear operators and supervisors for the Naval nuclear-powered Fleet is accomplished. NPTU's mission is to provide enough trained and certified operators to meet the Fleet's Naval nuclear operator manning requirements. If NPTU Charleston does not meet this demand, then nuclear-powered warships, which comprise 45 percent of the Navy's major combatants, will not be sufficiently staffed with trained reactor plant operators and officers to perform missions vital to national security.

Alternatives: The Navy identified five action alternatives that best accommodated the elements of the Proposed Action and the no action alternative. Under any of the action alternatives no more than 7 wetland acres would be affected: 0.5 acres of tidal wetlands would be disturbed and 6.5 forested wetlands would be removed.

Alternative 1 (the preferred alternative)- would best meet NPTU's mission and accommodate the needs presented above. Specifically, this alternative would include: construction of two training, academic, administrative, and support facilities; involve a bow-to-bow MTS configuration; a 300-foot expansion of existing Pier X-Ray North to support the newer MTSs; increase the number of parking spaces to about 1,900; upgrade existing utilities and infrastructure; and better existing security at NPTU by establishing a new and separate welcome/pass facility, building a new security tower at Pier X-Ray North, replacing existing on-land security fencing, and moving current in-water Port Security Barriers to accommodate the newer MTSs and expanded pier. Demolition of an existing 2,500 square-foot storage and handling facility and parking spaces would also occur under this preferred alternative (see Enclosure 2).

Alternative 2- Alternative 2 entails the same elements as Alternative 1 (i.e., construction schedule, approximate 300-foot pier extension and renovations, facility requirements, security needs, and access). It would meet all NPTU mission requirements, but would include constructing a multi-level parking structure to accommodate up to 500 vehicles and surface parking (by not constructing Parking Area 3) to support about 1,400 spaces.

Alternative 3- Alternative 3 is the same as Alternative 1 except for MTS mooring configuration, which would be bow-to-stern. This mooring configuration would require 110 ft between the two MTSs to maintain minimum separation for the survival moorings. To support this configuration, Pier X-Ray North would need to be lengthened by 480 ft (versus the 300-ft length found under Alternatives 1 and 2), for a total of 24,400 sf.

Alternative 4- Alternative 4 meets NPTU mission requirements and involves the same elements as Alternative 3. However, a multi-level parking structure would be built to accommodate 500 spaces and land cleared and paved to support about 1,400 more spaces. The MTS configuration would be bow-to-stern, the pier extended a total of 480 ft, and the PSB placed to ensure the 100-ft security distance.

Alternative 5- Under Alternative 5, a support facility (TSB 2A) would not be built, therefore, functions currently undertaken in IX-516 barge would remain at NPTU Charleston, but upgraded to better support increases in student numbers. To implement this alternative, IX-516 would move and be maintained at Pier X-Ray South.

No Action Alternative- Under the No Action Alternative, the current NPTU facilities would remain unchanged. However, the long-term, 50-percent increase in student throughput will still occur and the two replacement MTSs will arrive as scheduled. Under this alternative, no additional support facilities, utility upgrades, security improvements, parking space additions, or extended/constructed piers would occur. By adopting this alternative, NPTU Charleston would be considerably strained to meet the mandated increased student throughput or MTS transition.

Figure 1 –Vicinity Map of NPTU Charleston

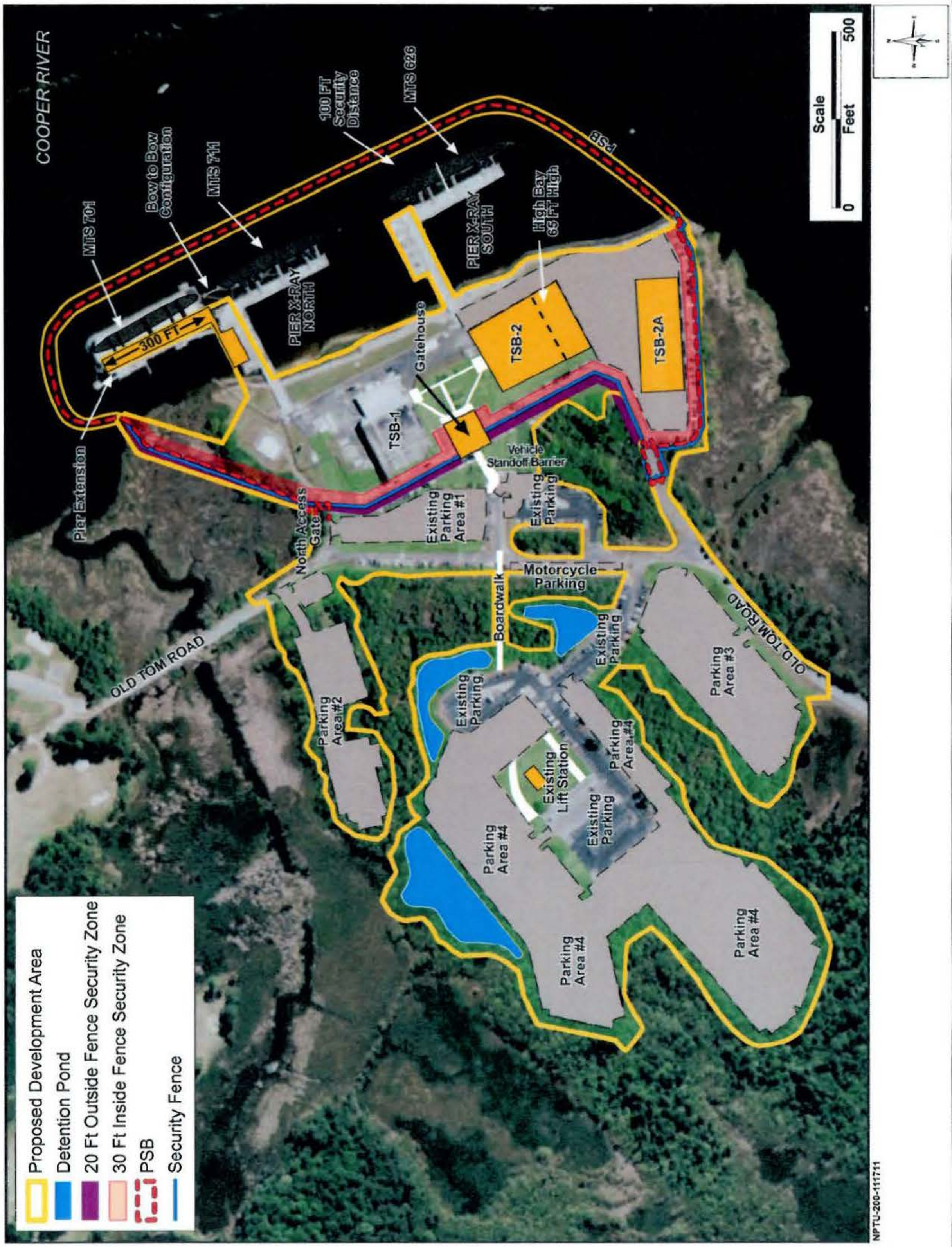
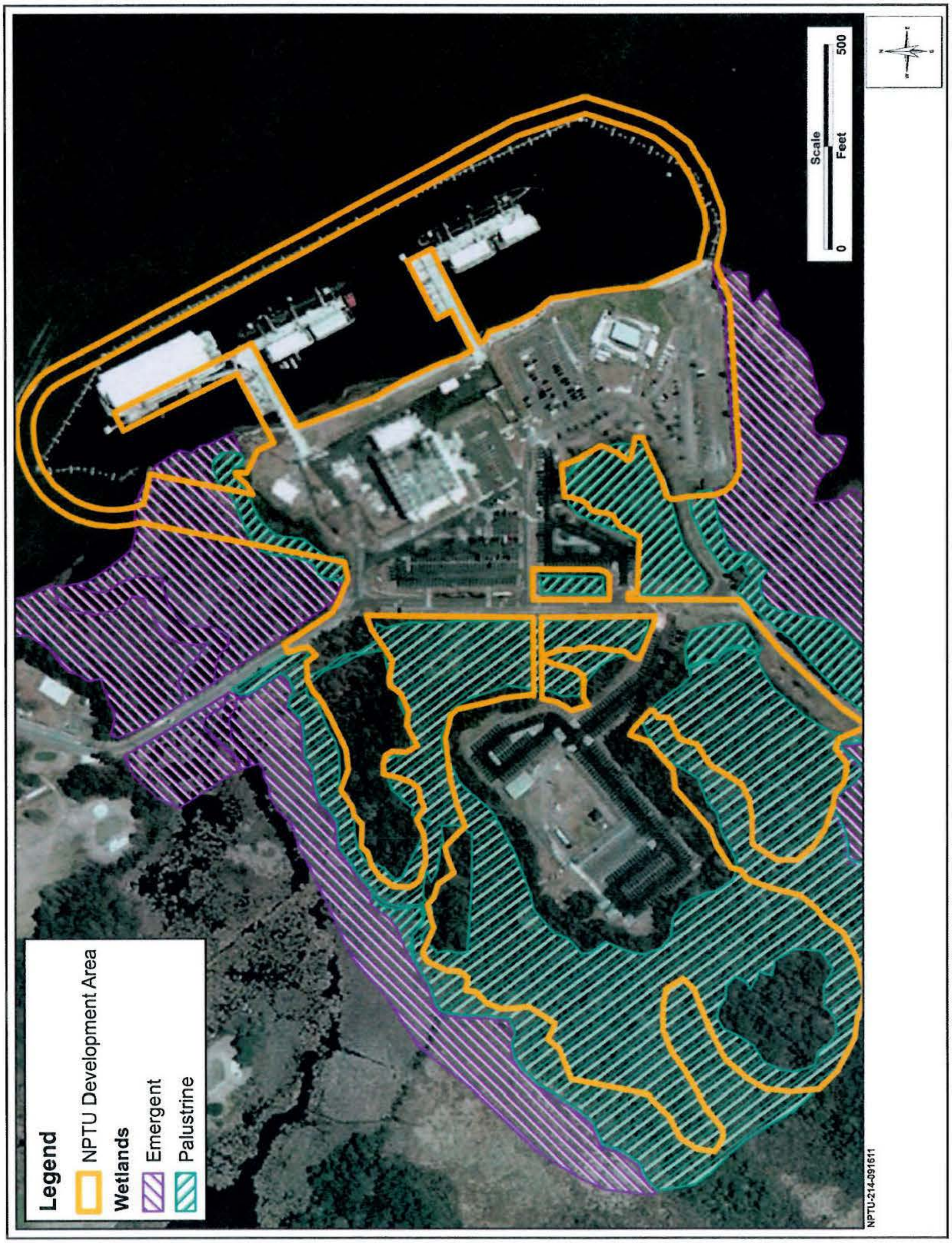


Figure 2 – Location of Construction Elements of Alternative 1 (Preferred Alternative)



Location of Wetlands and Floodplains Associated with Alternatives 1-5

Freshwater and estuarine wetlands are present at NPTU Charleston. A jurisdictional wetland survey of the area proposed for development was completed in August 2011, and is pending approval by the U.S. Army Corps of Engineers. Most of the large wetlands areas within the area of proposed development are palustrine forested and palustrine emergent. There are also smaller portions of estuarine wetlands within the area of proposed development that include both saltwater and brackish marshes. No more than 7 acres potentially disturbed under any of the action alternatives.

The 100-year floodplain covers the entire NPTU Charleston area; therefore, there is no other practicable alternative for improving the infrastructure at NPTU Charleston. Other alternative strategies were considered that would have eliminated the need for construction within the floodplain; however, none were feasible given the need for proximity to the MTSs and the piers.

Enclosure 5

FEDERAL AGENCY COASTAL ZONE MANAGEMENT ACT (CZMA) CONSISTENCY DETERMINATION FOR THE STATE OF SOUTH CAROLINA

As defined by the South Carolina's CMP (S.C. Code Ann. §§ 48-39-20 A-F, §§48-39-30 A,B1,2,3], §§ 48-39-50 A,C,M, §§ 48-39-80 A-E), coastal area includes all lands, all coastal waters, and submerged lands seaward to the State's jurisdictional limits and all lands and waters in the counties of the State which contain one or more of the critical areas. These counties are Beaufort, Berkeley, Charleston, Colleton, Dorchester, Horry, Jasper, and Georgetown. Critical areas include coastal waters, tidelands, beaches, and primary oceanfront sand dunes. The coastal zone extends seaward to 3 nautical miles into the Atlantic Ocean. South Carolina's CMP is comprised of 14 resource policies for activities in the coastal zone subject to management (Table 1). The policies are those which the Office of Ocean and Coastal Resource Management are authorized to enforce through the authority of the CMP and the South Carolina Coastal Management Act of 1977.

The Navy is obligated to ensure that its activities which affect any land or water use or natural resource of the coastal zone be consistent to the maximum extent practicable with the enforceable polices of federally approved state coastal management programs.
The Navy has determined that the expansion of NPTU training facilities Beaufort County under Alternatives 1, 2, 3, 4, and 5 is consistent to the maximum extent practicable with the enforceable policies of the South Carolina CMP based on the following information, data, and analysis (given as a summary in Table 1 and presented as analysis in Chapter 3 of the Environmental Assessment).

Table 1 South Carolina Coastal Management Program Consistency Review

SC CMP Enforceable Policy	Consistency Review					
	Alternative 1 (Preferred Alternative)	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*	*No Action Alternative*
Residential Development	The Preferred Alternative does not include residential development, and would not affect any residential development programs.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative; the No Action alternative would involve no development.
Transportation Facilities	The Preferred Alternative does not include development of: ports; highways; airports; or railways. New parking areas would be developed under the Preferred Alternative and would impact up to 7 acres of wetlands. However, all required permitting and compliance with USACE and SCDHEC regulations and any necessary mitigation would be undertaken. The parking areas are required to be in proximity to the MTSs and other training facilities. The proposed action is not anticipated to have a significant impact on regional traffic or transportation.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	The No Action alternative would involve no new development and would have no impacts on transportation facilities.
Coastal Industries	The Preferred Alternative does not include development of: agriculture; forestry (silviculture); mineral extraction; manufacturing; fish and seafood processing; or aquaculture, and would not affect any such coastal industries.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative; the No Action alternative would have no impact on coastal industries.
Commercial Development	The Preferred Alternative does not include commercial development, and would not affect any commercial development programs.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative

Table 1 South Carolina Coastal Management Program Consistency Review

SC CMP Enforceable Policy	**Consistency Review**					
	Alternative 1 (Preferred Alternative)	***Alternative 2***	***Alternative 3***	***Alternative 4***	***Alternative 5***	***No Action Alternative***
Recreation and Tourism	The Preferred Alternative would not involve the development of any public recreational lands. No new recreational lands would be developed, and no significant impacts to recreation or tourism would occur.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative; the No Action alternative would involve no development.
Marine Related Facilities	The Preferred Alternative does not include development of: marinas or boat ramps. The action does require expansion of an existing Navy pier and security barrier to accommodate the newer MTSs. All necessary permitting and coordination with USACE and SCDHEC will occur along with any necessary mitigation. Pier expansion will not impact navigation.	Same as Preferred Alternative	Same as Preferred Alternative but would require a longer pier expansion.	Same as Preferred Alternative but would require a longer pier expansion.	Same as Preferred Alternative	No Action alternative would involve no development.
Wildlife and Fisheries Management	This policy addresses OCRM issuance or review and certification of permit applications within the coastal zone as well as development of artificial reefs and impoundments. No artificial reefs or impoundments would be developed or altered by the Preferred Alternative. No significant impacts to wildlife or fisheries management are anticipated to occur.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative
Dredging	The Preferred Alternative would require dredging. However, the dredging would occur in areas and to depths already under permit by the USACE.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative

Table 1 South Carolina Coastal Management Program Consistency Review

SC CMP Enforceable Policy	Consistency Review					
	Alternative 1 (Preferred Alternative)	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*	*No Action Alternative*
Public Services and Facilities	The Preferred Alternative would occur completely within the boundaries of NPTU Charleston, Joint Base Charleston and would not interfere with public services or facilities. Though there would be a personnel increase for students and staff that work at NPTU Charleston these personnel would live off station, no significant impacts to public services or facilities would occur.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	The No Action alternative would involve no development.
Erosion Control	The Preferred Alternative would involve the development of approximately 18 acres of vegetated and previously unpaved land to developed surfaces, which would result in both long-term and short-term minor soil disturbance and erosion. Best Management Practices (BMPs), including various State approved erosion and sediment control measures, will be vigorously incorporated into all project plans to minimize any significant impacts from erosion.	Similar to Preferred Alternative, however, with a total of 16 acres disturbed.	Similar to Preferred Alternative, however, with a total of 18 acres disturbed.	Similar to Preferred Alternative, however, with a total of 16 acres disturbed.	Similar to Preferred Alternative, however, with a total of 17 acres disturbed.	The No Action alternative would involve no new development and would have no impacts on soil erosion.
Energy and Energy-Related Facilities	The proposed facilities expansion would include diesel backup generators to be used in the event of power failure or to periodically test the generators. No power generation other than what would be needed by NPTU during a power outage would occur.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as the Preferred Alternative

Table 1 South Carolina Coastal Management Program Consistency Review

SC CMP Enforceable Policy	Consistency Review					
	Alternative 1 (Preferred Alternative)	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*	*No Action Alternative*
Activities in Areas of Special Resource Significance	This policy addresses OCRM issuance or review and certification of permit applications within the coastal zone. The Preferred Alternative does not include construction or other activities that would take place within the critical area or that would result in disturbance of barrier islands; dune areas; navigation channels (the proposed pier extension and Port Security Barriers do not encroach into the channel); and public open spaces. Proposed construction would impact up to 7 acres of wetlands (up to 6.5 acres of forested wetlands and 0.5 acres of tidal wetlands). Coordination with USACE and with SCDHEC during the wetland permitting process will ensure that all necessary mitigation will occur as required. It is anticipated that the proposed facilities will have no direct or indirect impacts on unique natural areas; USFWS consultation will be completed and described in the final EA.	Same as Preferred Alternative, but with only 5 acres of wetland impacts.	Same as Preferred Alternative.	Same as Preferred Alternative but with only 5 acres of wetland impacts.	Same as Preferred Alternative.	The No Action alternative would involve no development.

Table 1 South Carolina Coastal Management Program Consistency Review

SC CMP Enforceable Policy	Consistency Review					
	Alternative 1 (Preferred Alternative)	*Alternative 2*	*Alternative 3*	*Alternative 4*	*Alternative 5*	*No Action Alternative*
Stormwater Management Guidelines	All construction under the Preferred Alternative will occur within the 100 year floodplain and need to be located within close proximity. All proposed facilities would take into account the location within the 100-year floodplain and would be designed to minimize any impacts to the floodplain and to withstand a potential flood event. Impacts to the floodplain would be minor. Other alternative strategies were considered that would have eliminated the need for construction within the floodplain; however, none were feasible given the need for proximity to the MTSs and the piers.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Current facilities are located within the 100 year floodplain. Under the No Action alternative, no construction would occur so there would be no impacts to stormwater management.
Mitigation Guidelines	This policy addresses development projects in the eight county coastal zone of South Carolina which require state or federal permits or are direct federal activities. Development and operation of the proposed facilities expansion will include incorporation of numerous BMPs in order to fully protect coastal zone resources. The new facilities would be constructed using Leadership in Energy and Environmental Design (LEED) design principals where applicable given the location within the Warf Alpha blast arc. The Navy would obtain and adhere to all applicable federal, state, and local permits.	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	Same as Preferred Alternative	The No Action alternative would have no impact on critical area resources.

APPENDIX D

DETAILED ANALYSES OF NORMAL OPERATIONS AND ACCIDENT CONDITIONS FOR RADIOLOGICAL SUPPORT FACILITIES

APPENDIX D DETAILED ANALYSES OF NORMAL OPERATIONS AND ACCIDENT CONDITIONS FOR RADIOLOGICAL SUPPORT FACILITIES

1.0 INTRODUCTION

Normal operations and accidents have been evaluated for Nuclear Power Training Unit (NPTU) Charleston support operations to estimate the potential for releases of radioactive material. The results of these analyses, predicted as a result of a postulated release of radioactive materials into the environment, are presented in terms of the health effects on facility workers and the public. Effects on environmental factors are also presented, based on the amount of land that could be impacted due to postulated accidents.

Accidents were considered for inclusion in detailed analyses if they were expected to contribute substantially to risk (defined as the product of the probability of occurrence of the accident and the consequence of the accident). Accidents were categorized into three types: Abnormal Events, Design Basis Accidents, or Beyond Design Basis Accidents. These categories are characterized by their probability of occurrence as described further in Section 2.6 of this appendix. Three hypothetical accidents were analyzed using site-specific data. The first scenario is a fire in the NPTU Charleston radiological support facility that spreads to radioactive material resulting in an airborne release of radioactivity. The second accident scenario is a spill of radioactive water purification media during discharge from a Moored Training Ship (MTS) into a shipping container. The third scenario is a spill of radioactive liquid from a collection facility into surrounding waters.

1.1 USE OF SCIENTIFIC NOTATION

Much of the data in this appendix is presented using scientific notation. Scientific notation is commonly used to represent very large or small numbers. It consists of a number multiplied by the appropriate power of 10. For example, 0.0000035 would be represented as 3.5×10^{-6} and 3,500,000 would be represented as 3.5×10^{6}.

1.2 RISK FROM NORMAL OPERATION

Table D-1 presents the annual risk of cancer to a member of the general population living within a 50-mile radius of NPTU Charleston and for the maximally exposed off-site individual (MOI) due to radiological releases from normal radiological support facility operations. The population within a 50-mile radius of NPTU Charleston is estimated to be 648,975, based on 2000 U.S. Census data. The normal incidence of cancer for a typical population has been included for comparison. The results in this table were calculated using the methods described in Section 2.0 of this appendix. The results show that the annual individual risk of a cancer occurring in the general population within 50 miles of NPTU Charleston due to normal operations is very low, less than one in 68 billion. See Section 3.1 of this appendix for more information on calculation of risks from normal operation.

Table D-1 Annual Risk of Cancer from Normal Operations

NPTU Charleston	**Average Annual Risk of Cancer to a Member of the General Population**	**Individual Annual Risk of Cancer to the Maximally Exposed Off-Site Individual**	**An Individual's Annual Risk of Cancer Incidences**
Current Operations (2 S5W MTSs)	1 in 110 billion (9.1×10^{-12})	1 in 370 million (2.7×10^{-9})	1 in 193 (5.2×10^{-3})
Transition Period (2 S6G + 1 S5W MTSs)	1 in 68 billion (1.5×10^{-11})	1 in 200 million (4.9×10^{-9})	1 in 193 (5.2×10^{-3})
Long Term (2 S6G MTSs)	1 in 82 billion (1.2×10^{-11})	1 in 260 million (3.9×10^{-9})	1 in 193 (5.2×10^{-3})

1.3 RISK FROM HYPOTHETICAL RADIOLOGICAL SUPPORT OPERATIONS ACCIDENTS

Three hypothetical radiological support operations accidents were analyzed for NPTU Charleston using the methods described in Section 2.0 of this Appendix. The analysis does not combine the risks associated with the accidents. The risks presented in this section result from extremely conservative analyses and more refined analyses would not be expected to result in increases in calculated risk.

The accident that results in the highest cancer risk is a fire in the radiological support facility that involves radioactive materials. As was the case for the normal operations evaluation, the accident cancer risk is very low.

Table D-2 presents a summary of the risk of cancer for a hypothetical fire at a radiological support facility, the risk for a hypothetical release of liquid containing low-level radioactivity, and, for comparison, the risk of cancer from all sources in a typical population. This summary table shows that the annual individual cancer risk to a member of the general population due to accidents associated with support operations for NPTU Charleston is very low, one in 740 million. (See Section 3.2 of this Appendix for more information on calculation of cancer risks associated with hypothetical accidents at support operations.)

Table D-2 Annual Risk of Cancer from Radiological Support Operations Accidents

Location	**Average Annual Risk of Cancer to a Member of the General Population From a Fire**	**Individual Average Annual Risk of Cancer to a Maximally Exposed Off-Site Individual From a Fire**	**Average Annual Risk of Cancer to a Member of the General Population From a Liquid Spill**	**Average Annual Risk of Cancer to a Maximally Exposed Off-Site Individual From a Liquid Spill**	**Average Annual Risk of Cancer to Member of the General Population From a Purification Media Spill**	**Average Annual Risk of Cancer to Maximally Exposed Off-Site Individual From a Purification Media Spill**	**An Individual's Annual Risk of Cancer Incidences**
NPTU Charleston	1 in 740 million (1.4×10^{-9})	1 in 9 million (1.1×10^{-7})	1 in 490 billion (2.1×10^{-12})	1 in 250 billion (3.9×10^{-12})	1 in 360 billion (2.8×10^{-12})	1 in 170 billion (6.0×10^{-12})	1 in 193 (5.2×10^{-3})

1.4 RADIOLOGICAL IMPACT ON ENVIRONS

The radiological impact of accidents on the environs of NPTU Charleston was determined by examining the area that could be contaminated following an accident. To determine the area that could be contaminated, calculations using average meteorological conditions provided input for the accident scenario (95-percent worst-case meteorology was used when calculating exposure and risk to workers and the general population). These calculations are based on contamination that causes only a small increase in background radiation from naturally occurring sources. For the fire accident analyzed, the contaminated area was confined to the boundaries of the base within areas controlled by NPTU Charleston during radiological events. The impact of this contamination would be temporary while the area was isolated and remediation efforts completed; however, the analysis of the accident presented elsewhere in this EA makes the conservative assumption that no isolation or removal occurs.

A footprint was not calculated for the release of a radioactive liquid and radioactive water purification media spill accidents, due to the rapid dilution of the radioactive material that occurs in the water.

The conclusion that there are no significant radiological impacts associated with NPTU Charleston radiological operations is based on the Navy's record of safe operation of nuclear-powered warships and a comprehensive environmental monitoring program performed by the Navy and corroborated by independent monitoring that has been in place for decades. Chapter 3.11 of the EA provides a detailed discussion of both the Navy’s record and environmental monitoring program.

1.5 CALCULATIONS OF RISK AND CONSEQUENCE

This EA provides several discussions on the topics of human health effects caused by radiation and the risks associated with normal operations or postulated accidents. It is important to understand these concepts and how they are used to understand the information presented in this document. It is also valuable to have some frame of reference or comparison for understanding how the risks compare to the risks of daily life.

The EA radiological analyses used a methodology that is consistent with other federal agencies' guidance for preparing NEPA documentation involving radiological analyses (see Section 6.2 U.S. Department of Energy, Office of NEPA Policy and Compliance, *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements*, Second Edition, December 2004). The incidence of cancer was evaluated using International Commission on Radiological Protection (ICRP) methodology (ICRP 2007), which is also consistent with the methodology set forth in the National Academy of Sciences (NAS) Biological Effects of Ionizing Radiation Report (NAS 1990).

The method used to calculate the risk of any impact is fundamental to all of the evaluations presented and follows standard accepted practices. The first step is to determine the probability that a specific event will occur. For example, the probability that a routine task, such as operating a crane, will be performed sometime during a year of normal operations at a facility would be 1.0. That means that the action would certainly occur. The probability that an accident might occur is less than 1.0. This is true because accidents occur only occasionally and some of the more severe accidents, such as a catastrophic earthquake, might occur at any location only once in hundreds, thousands, or millions of years.

Once the probability of an event has been determined, the next step is to predict what the consequences of the event being considered might be. One important measure of consequences chosen for this EA is the number of cancers induced by radiation. This was chosen because this document deals with radioactive materials. The number of cancers that might be caused by any routine operation or any postulated accident can be calculated using a standard technique based on the amount of radiation exposure that might occur from all conceivable pathways and the number of people who might be affected (refer to Section 2.2 of this Appendix).

Two examples illustrate the calculation of risk. In the first, the lifetime risk of dying in a motor vehicle accident can be computed from the likelihood of an individual being in an automobile accident and the consequences or number of fatalities per accident. There were 5,505,000 motor vehicle accidents during 2009 in the United States resulting in 33,808 deaths (National Highway Traffic Safety Administration 2010). Thus, the probability of a person being in an automobile accident is 5,505,000 accidents divided by 308,745,538 persons in the United States, or about 0.02 per year. The number of fatalities per accident, 0.006 (33,808 deaths divided by 5,505,000 accidents), is less than one since many accidents do not cause fatalities. Multiplying the probability of the accident (0.02 per year) by the consequences of the accident (0.006 deaths per accident) by the number of years the person is exposed to the risk (78.2 years is considered to be an average lifetime as of 2009 (National Vital Statistics Report 2011)) gives the risk for any individual being killed in an automobile accident. From this calculation, the overall risk of someone dying in a motor vehicle accident is about one in 110 over his or her lifetime.

As a further comparison, the naturally occurring radioactive materials in agricultural fertilizer contribute about l to 2 millirem (mrem) per year to an average American's exposure to radiation (NCRPM 2009, 1987). A calculation similar to the one in the preceding paragraph shows that the use of fertilizer to produce food crops in the United States results in a lifetime risk of cancer from this radiation between one in 23,250 and one in 11,626, respectively. Finally, the average American's risk of cancer from all causes is one in 2.5 over his or her entire lifetime (American Cancer Society 2011). These risks can be compared, for example, to the average individual risk of less than one in 200 million for a resident near the MTSs location of developing cancer over that person's entire lifetime due to normal operations and support of MTSs. These risks and others from everyday life can be used to gain a perspective on the risks associated with the site operation at NPTU Charleston.

A frame of reference for the lifetime risks from accidents associated with MTS operations and support can be developed in the same way. For example, for an average resident within 50 miles of NPTU Charleston, the individual risk of cancer over a person’s entire lifetime caused by a radioactive material fire in the support facility would be approximately one in 9 million. This individual risk was determined by dividing the risk per year value to the population within 50 miles (8.8×10^{-4}) by the population total (648,975) and multiplying by an average life span of 78.2 years. This risk can be compared to the risks of death from other accidental causes to gain a perspective. For example, earlier calculations showed the lifetime risk of death in a motor vehicle accident to be about one in 110. Similarly, the lifetime risk of death for the average American from fires is approximately one in 1,500 (National Fire Protection Agency 2010). The lifetime risk of death from accidental poisoning is about one in 132 (National Center for Injury Prevention and Control [NCIPC] 2007).

2.0 PATHWAYS ANALYSIS

Accidents were considered for inclusion in detailed analyses if they were expected to contribute substantially to risk. The pathways from radiological support operations, which may affect the public, are direct exposure to radiation, inhalation of radioactive materials, and ingestion of radioactive materials. Recognizing these fundamental processes and pathways, three hypothetical accidents were postulated:

- A fire involving radioactive material in the radiological support facility.
- A spill of radioactive purification media during transfer from an MTS to transportation container.
- A spill of radioactive liquid from the radiological support facility.

The first scenario is a fire in a radiological support facility that spreads to radioactive material and results in an airborne release of radioactivity. The amount of radioactivity released during this accident scenario was conservatively established at 1 Curie of ^{60}Co and the proportional amounts of other radioactive elements expected to be present with the ^{60}Co. This represents a conservative amount of radioactivity as compared to the typical amount that might accumulate within a support facility due to normal operations. Note that this amount of activity is more than 500 times the annual amount released to harbors within the 12-mile coastal waters by the entire nuclear navy. For the analysis, several conservative assumptions were used as follows:

- The meteorological conditions are considered to be 95-percent worst case (with no credit given that the likelihood of these conditions is only one in 20).
- No evacuation of the public is assumed.
- No cleanup of the contaminated area is assumed to occur.

These assumptions are conservative since radioactive material storage facilities are specifically constructed to inhibit the spread of fire and have installed automatic sprinkler systems. Moreover, emergency response measures include provisions for immediate response to any emergency, identification of the accident conditions, and communications with state and local authorities.

The second scenario is a spill of purification media during the transfer of this radioactive material from the ship to a transportation cask into surrounding waters. The released radioactivity is evaluated for transfer from the location of release to the public through tidal movements and ingestion by fish and crustaceans. The amount of purification media release was assumed to contain 2 Curies of ^{60}Co and the proportional amounts of other radioactive elements expected in this material to be present with the ^{60}Co. These assumptions are conservative since this operation would only be performed once and may be performed in a dry dock rather than pier-side. In addition, there will be significant engineering of the discharge set up to ensure that no purification media is released to the environment. The discharge operation if conducted pier-side, would be conducted in verbatim compliance with detailed written operating procedures and under the oversight of management and safety organizations. Some of the features engineered will be containment of the transfer hose to ensure any leakage is captured and controlled and prevented from entering the environment. This accident assumes that all of the engineered precautions fail and the material being transferred is all discharge into the surrounding water and not back into the ship or the shipping cask.

The third scenario is a spill into surrounding waters of radioactive liquid from a collection facility. The released radioactivity is evaluated for transfer from the location of release to the public through tidal movements and ingestion by fish and crustaceans. The amount of water release was assumed to contain 1 Curie of ^{60}Co and the proportional amounts of other radioactive elements expected to be present with the ^{60}Co. These assumptions are conservative since it would require a spill of over 3 million gallons of radioactive liquid (discharged primary coolant) at levels normally contained in NPTU Charleston collection facilities, which has tanks no larger than 6,000 gallons. Furthermore, the total capacity to store radioactive liquid in the NPTU Charleston radiological support facility is less than 22,000 gallons.

Examining the kinds of accidents that could result in release of radioactive material to the environment or an increase in radiation levels, shows that they can only occur if an accident produces severe conditions. Some types of accidents, such as procedure violations, spills of small volumes of water containing radioactive particles, or most other types of human error, may occur more frequently than the more severe accidents analyzed. However, they involve minute amounts of radioactive material and thus the consequences are insignificant relative to the accidents evaluated. Stated another way the very low consequences associated with these events produce smaller risks than those for the accidents analyzed, even when combined with a higher probability of occurrence. Consequently, they have not been evaluated in greater detail in this EA.

The EA analyses performed for NPTU Charleston radiological operations are such that the estimates provided are unlikely to be exceeded during normal operations, accident events, or acts of terrorism. The accidents analyzed include conservative estimates of the amounts of radioactive material at the radiological support operations; therefore, acts of terrorism would result in consequences bounded by the results of accidents evaluated in the EA. Even using these conservative analytical methods, the risks are very small and support the conclusion that there are no significant radiological impacts associated with radiological operations at NPTU Charleston.

2.1 Calculations of Radiation Exposures

An evaluation of normal operations and hypothetical accidents at NPTU Charleston was performed to assess the possible radiation exposure to individuals due to the release of radioactive materials from the NPTU Charleston radiological support operations.

Radiation exposure to the following individuals and general population is calculated for normal operations and for accident conditions:

- Worker—An individual located 100 meters (330 ft) from the radioactive material release point.
- Nearest public access individual (NPA)—Military personnel, civilian employees, or their family members, including some who reside on the base, may be located outside the NPTU Charleston controlled area boundary but inside the confines of the military base. Such people may be in their homes, buildings, or on the roadways or golf course of the base at the time of an accident or at any time throughout the year for the evaluation of normal operations. For analyses of accidents, people on an adjacent JB CHS golf course and picnic area are the NPA individuals. In the event of an accident, evacuation of these NPA individuals would take place within 2 hours, under military control of the base. The accident calculations use 2 hours as the time of exposure.
- Maximally exposed off-site individual (MOI)—A theoretical individual living at the Joint Base Naval Weapons Station boundary receiving the maximum exposure. The assumption is that no evacuation of this individual occurs.
- General U.S. population within a 50-mile radius of the facility—Consistent with the requirements of NEPA, the results presented in the following tables identify the potential radiological impacts to the people living within 50 miles of the facility. The sections that follow provide a brief discussion of the results of this analysis.

Exposure would result from direct radiation from the facility and exposure to radioactive contamination released to the air and water. Releases directly to the water pathway occur because support operations are located directly on bodies of water, and contamination of the water results from fallout of airborne contamination. The releases to the air and water might result in exposure through several pathways, described as follows:

- External direct exposure from immersion in the airborne radioactive material (air immersion).
- External direct exposure from radioactive material deposited on the ground (ground surface).
- Internal exposure from inhalation of radioactive aerosols and suspended particles (inhalation).
- Internal exposure from ingestion of terrestrial food and animal products (ingestion).
- Exposure from and ingestion of contaminated water.

The computer programs, discussed in Section 2.5 of this Appendix, calculate radiation dose in a manner recommended by the ICRP (ICRP 1991). The programs use weighting factors for various body organs to calculate a committed effective dose equivalent (CEDE) from radiation inside the body due to inhalation or ingestion. The programs calculate committed dose equivalents (CDEs) for organs such as the lungs, stomach, small intestine, upper large intestine, lower large intestine, bone surface red bone marrow, testes, ovaries, muscle, thyroid, bladder, kidneys, and liver. The CEDE value is the summation of the CDEs to the specific organ weighted by the relative risk to that organ compared to an equivalent whole-body exposure. The programs calculate an effective dose equivalent (EDE) for the external exposure pathways (immersion in the radioactive material, exposure to ground contamination) and a 50-year CEDE for the internal exposure pathways. In addition, the programs calculate the sum of the EDE from external pathways and the CEDE from internal pathways, called the total effective dose equivalent (TEDE). The TEDE reported in the results section is the sum of the TEDEs from air, water, and direct radiation exposures.

The calculation of exposure from ingestion of terrestrial food, animal products, and drinking water is on a yearly basis. However, there would be a suspension of continued consumption of contaminated food products and water by the public after reaching a protective action guideline. In 1991, the USEPA provided protective action guidelines in the range of 1 to 5 rem whole-body exposure. To ensure a consistent analysis basis, the analysis does not account for reduction of exposure due to a protective action guideline. This results in a conservative approach that may overestimate health effects within an exposed population, but allows for consistent comparisons.

2.2 CALCULATION OF HEALTH EFFECTS

Health effects are calculated from the exposure results. Publication 103 of the ICRP (ICRP 2007) provides the factors used for calculations of health effects. Table D-3 lists the appropriate factors used in the analysis of both the normal operations and the hypothetical accident scenarios. Health effect factors are higher for the general population because the general population includes children. Cancer factors are based on cancer incidence weighted for lethality and life impairment. Total health effects to the general population include cancer risks and heritable effects.

Since all of the analyses in this appendix present the consequences in terms of radiation exposure (rem), the health effect of interest can be determined by multiplying the radiation exposure by the health effect factor of interest from Table D-3. For example, the number of people in the general population expected to develop cancer as a result of a hypothetical support facility fire at NPTU Charleston can be calculated by obtaining the exposure from Table D-11 (320 rem) and multiplying it by the health effect factor from Table D-3 (5.5×10^{-4}) to get 1.8×10^{-1} or 0.18. Similar calculations are possible for other accidents or health effects of interest.

Table D-3 Estimators for Health Effects from Ionizing Radiation

Effect	Nuclide	Health Effect Factor (Probability per rem)[1]	
		Worker	*General Population*
Cancer Risk (all organs)	All	4.1×10^{-4}	5.5×10^{-4}
Heritable effects[2]	All	0.1×10^{-4}	0.2×10^{-4}
Total effects[2]	**All**	$\mathbf{4.2 \times 10^{-4}}$	$\mathbf{5.7 \times 10^{-4}}$

Notes:
1. For high individual exposures (20 rem), the above factors are multiplied by a factor of two. There is no modification of general population exposures, because the large drop in exposure with increasing distances results in average exposure rates well below 20 rem.
2. In determining a means of assessing health effects from radiation exposure, the ICRP has developed a weighting method for lethal or life impairing cancers and heritable effects to obtain a total effect, or "health detriment."

2.3 POPULATION DISTRIBUTION

The evaluation used population distributions specific to NPTU Charleston obtained from the population data shown in Table D-4. The source of these population distributions was the 2000 U.S. Census data. The population information was obtained in 16 compass directions and five equal 10-mile-radial distances from within 10 to 50 miles.

Table D-4 Population Distribution Around NPTU Charleston

Direction	Within 50 miles	Within 40 miles	Within 30 miles	Within 20 miles	Within 10 miles
N	24,915	17,886	11,853	3,882	346
NNE	15,222	4,742	2,686	762	307
NE	24,132	5,410	2,482	1,698	758
ENE	5,308	4,994	3,783	1,687	511
E	2,164	2,164	2,164	2,164	793
ESE	6,913	6,913	6,913	6,913	3,958
SE	21,047	21,047	21,047	21,047	12,349
SSE	31,148	31,148	31,148	31,148	13,234
S	66,677	66,677	66,677	66,351	11,474
SSW	74,245	74,245	74,222	69,138	24,077
SW	66,361	64,346	61,655	54,047	31,744
WSW	38,857	35,974	34,147	30,727	25,706
W	85,076	67,262	60,242	57,128	23,365
WNW	111,291	102,821	97,701	90,641	34,280
NW	48,991	39,891	31,150	27,394	15,240
NNW	26,627	20,575	16,220	14,085	470
Total	**648,975**	**566,097**	**524,089**	**478,812**	**198,612**

2.4 METROLOGY

The meteorological data used in the analyses was obtained from a weather tower at NPTU Charleston. The meteorological data used for NPTU Charleston was obtained from a National Atmospheric Release Advisory Capability (NARAC) weather tower operated by the NPTU Charleston. The meteorological data from NARAC covered the time interval from October, 2009 to May, 2011. Weather data are collected from the NARAC tower every second and are averaged over 15 minute intervals and saved in a database. The 15 minute averages are evaluated with stability class to establish a frequency distribution of six wind speed intervals, 16 wind directions, and six stability categories.

The NARAC data provides the input to calculate the 95-percent meteorological conditions for the accident analyses. 95-percent meteorology is that combination of wind speed and stability class that results in doses that are exceeded in severity no more than 5-percent of the time. The 95-percent conditions represent the meteorological conditions that could produce the highest calculated exposure.

2.5.1 Computer Programs

The evaluation of the radiation exposures to the specified individuals and general population required use of two computer programs.

GENII

The code used for the environmental transport and exposure assessment calculations for normal operations and surface water transport and exposure for accident scenarios was GENII Version 2 (Napier *et al*. 2002). Pacific Northwest National Laboratory developed this code to incorporate the internal dosimetry models recommended by the ICRP and the risk estimating procedures of Federal Report 13 into existing environmental pathway analysis models. The GENII system was developed to provide a state-of-the-art, technically peer-reviewed and documented set of programs for calculating radiation dose and risk from radionuclides released to the environment.

The GENII system includes the capabilities for calculating radiation does following acute and chronic releases to water or air and calculates exposure from various pathways including direct exposure via water (swimming, boating, and fishing), soil (surface and buried sources), air (semi-infinite cloud and finite cloud geometries), inhalation, and ingestion. GENII provides risk estimates for health effects to individuals or populations by applying health effect factors to the effective dose, effective dose equivalent, or organ dose. In addition, GENII Version 2 uses cancer health effect factors from Federal Guidance Report 13 to estimate risk to specific organs or tissues.

RSAC-7.2

Battelle Energy Alliance developed, for the DOE-ID Operations Office, the computer code RSAC-7.2. The code calculates the consequences of a release of radionuclides to the atmosphere. RSAC-7.2 calculates internal dose using the dose conversion factors and methodology from the ICRP. RSAC-7.2 calculates doses through inhalation, immersion, ground surface, and ingestion pathways, and cloud gamma dose from semi-infinite plume model and finite plume models. RSAC-7.2 meteorological capabilities include Gaussian plume dispersion for Pasquill-Gifford models. Population exposures are the product of the calculated individual exposure and the number of people in the affected population.

2.6 ACCIDENT CATEGORIZATION AND PROBABILITY OF OCCURRENCE

Abnormal Events

Abnormal events are unplanned or improper events that result in little or no consequence. Abnormal events include industrial accidents and accidents during normal operation such as skin contamination with radioactive materials, spills of radioactive liquids, or exposure to direct radiation due to improper placement of shielding. In anticipation of the occurrence of these unplanned events, mitigation procedures are in place that promptly detect and eliminate the events and limit the effects of these events on individuals. As a result, there is little hazard to the general population from these events. Such events are considered to occur in the probability range of 1 to 10^{-3} per year. The probability referred to here is the total probability of occurrence and includes the probability the event occurs (e.g., fire) times other probabilities required for the consequences.

Design Basis Accident Range

Accidents that have a probability of occurrence in the range of 10^{-3} to 10^{-6} per year are included in the range called the Design Basis Accident Range. The terminology "design basis accident," which normally refers to facilities to be constructed, also includes the "evaluation basis accident," which applies to existing facilities. For accidents included in this range, results are presented for the 95-percent meteorological condition. Risk calculations for accidents in this range utilize the consequences associated with 95-percent meteorological conditions.

Beyond Design Basis Accidents

This range includes accidents that are less likely to occur than the design basis accidents but that may have very large or catastrophic consequences. Accidents included in this range typically have a total probability of occurrence in the range of 10^{-6} to 10^{-7} per year. There is no discussion of accidents that are typically less likely than 10^{-7} per year, since they do not contribute in any substantial way to the risk (see Section 6.5, U.S. Department of Energy, Office of NEPA Policy and Compliance, Guidance on NEPA Document Preparation, *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements,* Second Edition, December 2004.)

2.7 DETERMINATION AND EVALUATION OF IMPACTED AREA

The impacted area surrounding a facility following an accident was determined for the fire accident scenario. The impacted area is that area in which the plume deposited radioactive material to such a degree that an individual standing on the boundary of the fallout area would receive approximately 0.01 mrem per hour of exposure. If this individual spends 24 hours a day at this location, that person would receive about 88 mrem per year from the ground surface shine. This is within the 100 mrem per year limit of 10 CFR 20 for NRC-licensed reactor facilities.

To best characterize the affected area, 50-percent meteorology (Pasquill-Gifford Class F, wind speed 2.46 meters per second) was chosen (note that 95-percent worst-case meteorology was used when calculating exposure and risk to workers and the general population). The RSAC-7.2 results for ground surface dose were interpolated to determine the distance downwind where the centerline dose had dropped to approximately 88 mrem per year based on 24-hours-per-day exposure. For the wind class chosen, the plume remains within a single 22.5-degree sector. The area affected by the plume is determined as the entire sector contaminated to the calculated downwind distance. This area (footprint) was determined to be 0.25 mile in length and it covers an area of approximately 8 acres.

Although the plume would be contained within a single sector, the direction of the wind is unknown. Therefore, the analysis examined the site in all directions around NPTU Charleston, out to a distance equal to the footprint length. The contaminated footprint is contained within the base boundary controlled by NPTU Charleston during radiological events. Since the accidents occur over a short time, the acreage of the sector quoted is still an accurate indication of the total contaminated area. For the release of radioactive liquid and purification media accidents, a footprint was not calculated due to the rapid dilution of the radioactive material that occurs in the water.

For NPTU Charleston, the evaluation also considered secondary impacts of radiological accidents. Access to some areas may be temporarily restricted until cleanup is completed. The water used for drinking and industrial purposes is monitored and its use may be suspended during cleanup operations. In addition, some recreational activities may be suspended; however, no enduring impacts are expected. During an accident, temporary contamination of MTSs may occur. Cleanup operations would restore these ships to full readiness. A small number of individuals may experience temporary job loss due to temporary restrictions on farming, fishing, and other support activities near the facility during cleanup operations. There would be costs associated with the actual cleanup operations. Plants and animals on and around the site would experience no long-term impacts. A radiological support operation accident would not result in the extermination of any species nor would it affect the long-term potential for survival of any species. There would be no enduring impacts on treaty rights due to a radiological support operations accident.

2.8 RADIATION EXPOSURE TIME

For members of the public residing at the site boundary or beyond, no credit is taken for any preventive or mitigation actions that would limit their exposure. These individuals are modeled as being exposed to the entire contaminated plume as it travels downwind from the accident site (see Table D-5). Similarly, no action is taken to prevent these people from continuing their normal day-to-day routine, and ingestion of terrestrial food, animal products, and drinking water are modeled as continuing on a yearly basis. In addition, the public is modeled as spending approximately 30 percent of the day within their homes or other buildings; therefore, the exposure to ground surface radiation is reduced appropriately on a yearly basis.

Table D-5 Estimated Time an Individual Might be Exposed

Source	Worker (100 m)	Nearest Public Access	Individual at Nearest Site Boundary (MOI)
To Plume	5 minutes	100-percent of release time up to 120 minutes	100-percent of release time
To Fallout on Ground Surface	20 minutes	120 minutes	0.7 years
To Food	None	None	1 year

Individuals that reside or work on site would be evacuated from the affected area within 2 hours (see Table D-5). This is based on the availability of security personnel to oversee the removal of residents, workers, and visitors in a safe and efficient manner. Projected exposure of residents, workers, and visitors to the entire contaminated plume on site as it travels downwind would be for a period not to exceed 2 hours. Similarly, the radiation shine from the deposited radioactive materials would be limited to 2 hours. The calculations assume there is no ingestion of contamination for these individuals during the 2 hours.

Facility workers all undergo training to take quick, decisive action during a casualty. These individuals quickly evacuate the area and move to previously defined "relocation" areas on the facility site. Workers could receive up to 5 minutes of exposure to the radioactive plume as they move to the relocation centers. Once the immediate threat of the plume has moved off-site and downwind, the workers would be instructed to walk to vehicles waiting to evacuate them from the site. An additional 15 minutes would be required to evacuate the workers from the contaminated area; therefore, the calculations assume the workers receive a total of 20 minutes of ground shine. There is no ingestion of contamination included in calculations for these individuals during that time.

3.0 RESULTS FROM PATHWAYS ANALYSIS

3.1 NORMAL OPERATION

The purpose of this analysis is to determine the hypothetical health effects on workers and the public due to routine operations. Radioactive releases involved in routine support of MTSs at NPTU Charleston would be small. The USEPA regulates airborne emissions of Atomic Energy Act radionuclides, under the Clean Air Act pursuant to 40 CFR 61 Subpart I. The NNPP performed testing to establish more precisely the airborne releases of Atomic Energy Act radioactivity from selected NNPP activities, and submitted that information to USEPA. Those evaluations, completed in December 1995, reaffirmed that the total emissions of radioactivity from NNPP activities meet the USEPA standards by a factor of 10 to 100. The USEPA accepted the NNPP evaluation by letter dated October 1, 1997. The results of the NNPP evaluation, which were the basis for establishing compliance with the standards in 40 CFR 61, are also the basis for the emission estimates listed in this section. The NPTU Charleston analysis used site-specific monitoring, meteorological and population data. For normal operations, the radiation dose evaluation addresses workers, the maximally exposed off-site individual, the general population, and the nearest public access (NPA) individual. The NPA individual is a person living on the base in housing. Table D-1 presents health risks to the general population from normal operation in two ways. It lists the annual risk of a single cancer occurring in the entire population within 50 miles of the facility. The table also provides the average individual risk, which is calculated by dividing the annual risk value by the number of people living within 50 miles of the facility.

The radioactive material release source term for the analysis was conservatively estimated for the MTSs based on procedures approved by the USEPA for compliance with 40 CFR 61. Site-specific input parameters include distances to members of the public and wind speed and direction. The basis for the carbon-14 (^{14}C) source term for NPTU Charleston is the release from two S6G MTSs and one S5W MTS that could be operating simultaneously during the transition to S6G MTSs. ^{14}C is the dominant contributor to radiation dose and accounts for more than half of the radiation dose to the public. The ^{60}Co value is based on the value of actual measurements of ^{60}Co emissions from the exhaust of NPTU Charleston radiological support operations and MTSs. The Iodine values are based on the value of actual measurements of Iodine emissions from the exhaust of the MTSs. Table D-6 provides a listing of the radioactive nuclides used for the evaluation. Modeling assumes the release occurs at ground level.

Table D-6 Radionuclide Releases Used for Environmental Pathways Analysis

Radionuclide	NPTU Charleston (Projected Curies/year)
^{3}H	2.0
^{14}C	0.26
^{83m}Kr	1.1×10^{-2}
^{85}Kr	2.3×10^{-5}
^{85m}Kr	2.7×10^{-2}
^{87}Kr	3.5×10^{-2}
^{88}Kr	5.5×10^{-2}
^{131m}Xe	1.5×10^{-3}
^{133m}Xe	1.2×10^{-2}
^{133}Xe	3.0×10^{-1}
^{135}Xe	3.3×10^{-1}

Table D-6 Radionuclide Releases Used for Environmental Pathways Analysis

Radionuclide	NPTU Charleston (Projected Curies/year)
^{41}Ar	3.3
^{60}Co	2.7×10^{-6}
^{131}I	5.6×10^{-7}
^{132}I	1.3×10^{-6}
^{133}I	1.3×10^{-6}
^{134}I	3.2×10^{-5}
^{135}I	2.9×10^{-6}

Table D-7 summarizes the public health risk to the general population that might result from normal operation.

Table D-7 Radiological Health Effects from Normal Operation

NPTU Charleston	Total Radiation Exposure to Affected Population[1]	Annual Risk of Single Cancer in Entire Affected Population[2]	Population Estimate Within 50 Miles of NPTU Charleston[3]	Average Annual Risk of Cancer to a Member of the General Population[4]	Individual Annual Risk of Cancer to the Maximally Exposed Off-Site Individual[5]	An Individual's Annual Risk of Cancer Incidence[6]
Current Operation (Two S5W MTSs)	1.1×10^{-2} person-rem	1 in 170,000 (5.9×10^{-6})	648,975	1 in 110 billion (9.1×10^{-12})	1 in 370 million (2.7×10^{-9})	1 in 193 (5.2×10^{-3})
Transition Period (Two S6G and One S5W MTSs)	1.7×10^{-2} person-rem	1 in 100,000 (9.6×10^{-6})	648,975	1 in 68 billion (1.5×10^{-11})	1 in 200 million (4.9×10^{-9})	1 in 193 (5.2×10^{-3})
Long Term (Two S6G MTSs)	1.4×10^{-2} person-rem	1 in 130,000 (7.9×10^{-6})	648,975	1 in 82 billion (1.2×10^{-11})	1 in 260 million (3.9×10^{-9})	1 in 193 (5.2×10^{-3})

Notes:

1. This is total exposure to affected population within a 50-mile radius of the facility due to normal operation (person-rem).
2. Annual risk of a single cancer in the entire population within a 50-mile radius of the facility from radiation exposure due to normal operation is calculated by multiplying the total radiation exposure to affected population (rem) by 0.00055 cancers estimated to be caused by each rem (See Table D-3 in Appendix D).
3. This is the estimated number of people within a 50-mile radius of the facility from census data from Table D-4
4. Average annual risk of cancer for an average individual within a 50-mile radius of the facility from radiation exposure due to normal operation is calculated by dividing the total population cancer risk by the number of people within a 50-mile radius of NPTU Charleston. Risk of cancer is noted in parentheses.
5. The MOI is a theoretical individual living at the base perimeter receiving maximum exposure, calculated by multiplying the total radiation exposure to the MOI (rem, see Table D-11 of Appendix D) by 0.00055 cancers estimated to be caused by each rem (see Table D-3 in Appendix D).
6. This is the annual risk of an individual cancer incidence. Risk of cancer is noted in parentheses.

Table D-8 contains the detailed analysis results from normal operations as discussed in Section 3.1 of this Appendix. The radiation exposures to the individuals and to the general population living within 50 miles of NPTU Charleston would be so small that they would be indistinguishable from naturally occurring background radiation. The results show that the annual individual risk of a cancer occurring from normal operations in the general population within 50 miles of NPTU Charleston is low, less than one in 68 billion.

Table D-8 Analysis Results for Normal Operation

NPTU Charleston	Individual	Total EDE (rem)	Likelihood of Cancer
Current Operations (2 S5W)	Worker	6.9×10^{-5}	2.8×10^{-8} (1 in 35 million)
	NPA[1]	4.2×10^{-6}	2.3×10^{-9} (1 in 430 million)
	MOI[2]	4.9×10^{-6}	2.7×10^{-9} (1 in 370 million)
Transition Period (2 S6G + 1 S5W)	Worker	1.3×10^{-4}	5.4×10^{-8} (1 in 18 million)
	NPA[1]	7.7×10^{-6}	4.2×10^{-9} (1 in 240 million)
	MOI[2]	8.9×10^{-6}	4.9×10^{-9} (1 in 200 million)
Long Term (2 S6G)	Worker	8.2×10^{-5}	3.3×10^{-8} (1 in 30 million)
	NPA[1]	6.1×10^{-6}	3.4×10^{-9} (1 in 300 million)
	MOI[2]	7.1×10^{-6}	3.9×10^{-9} (1 in 260 million)
	Total Radiation Exposure to Affected Population[3]	***Annual Risk of Single Cancer in Entire Affected Population[4]***	***Average Annual Risk of Cancer to a Member of the General Population[5]***
Current	1.1×10^{-2} person-rem	5.9×10^{-6} (1 in 170,000)	9.1×10^{-12} (1 in 110 billion)
Transition	1.7×10^{-2} person-rem	9.6×10^{-6} (1 in 100,000)	1.5×10^{-11} (1 in 68 billion)
Long Term	1.4×10^{-2} person-rem	7.9×10^{-6} (1 in 130,000)	1.2×10^{-11} (1 in 82 billion)

Notes:
1. The NPA is the nearest public access individual.
2. The MOI is a theoretical individual living at the base receiving maximum exposure.
3. This is the total exposure to affected population within a 50-mile radius of the facility due to normal operation (person-rem).
4. This is the annual risk of a single cancer in the entire population within a 50-mile radius of the facility from radiation exposure due to normal operation.
5. This is the average annual risk of cancer for an average individual within a 50-mile radius of the facility from radiation exposure due to normal operation.

3.2 HYPOTHETICAL ACCIDENTS AT SUPPORT OPERATIONS

RSAC-7.2 evaluates the analysis of airborne releases from hypothetical accidents. Unless stated otherwise, RSAC-7.2 uses the following conditions when performing calculations. In most cases, RSAC-7.2 takes these conditions directly as defaults from the code.

Meteorological Data

- RSAC-7.2 takes wind speed, direction, and Pasquill stability from 95-percent meteorology. See Section 2.4 of this appendix for a discussion of meteorological conditions.
- RSAC-7.2 calculates the release as occurring at ground level (0 m).
- Mixing layer height is 400 meters (1,320 ft). Airborne materials freely diffuse in the atmosphere near ground level at the mixing depth. A stable layer exists above the mixing depth, which restricts vertical diffusion.
- Wet deposition is zero (no rain occurs to accelerate deposition and reduce the area affected).

- RSAC-7.2 models dry deposition of the cloud. During movement of the radioactive plume, a fraction of the plume deposits on the ground due to gravitational forces and becomes available for exposure by ground surface radiation and ingestion.
- The quantity of deposited radioactive material is proportional to the material size and speed. RSAC-7. 2 uses the following dry deposition velocities (m/s): solids = 0.001; halogens = 0.01; noble gases = 0.0; cesium = 0.001; ruthenium = 0.001.
- If radioactive releases occur through a stack, RSAC-7.2 can account for additional plume dispersion by calculating a jet plume rise. In this analysis, RSAC-7.2 uses no jet plume rise.
- When released gases have a heat content, the plume can disperse more quickly. In this calculation, RSAC-7.2 uses no buoyant plume effects.

Inhalation Data

- Breathing rate is 8.33×10^{-4} cubic meters per second (m^3/s) for worker, 4.69×10^{-4} m^3/s NPA, and 2.57×10^{-4} m^3/s for adults at site boundary and beyond (children have lower rates).
- Particle size of inhalant is 5 microns for worker and 1 micron for NPA, MOI, and General Population.
- The internal exposure period is 50 years for adults for individual organs and tissues, which have radionuclides committed to giving them dose.
- The public is exposed to the entire plume. Section 2.1 of this appendix discusses the worker and NPA exposures.
- RSAC-7.2 calculates internal doses using the ICRP 60 (1991) conversion factors and external dose with USEPA Federal Guidance Report No. 11 dose conversion factors.

Ground Surface Exposure

- The public is exposed to contaminated soil for one year. See Section 2.8 of this appendix for additional details.
- Building shielding factor is 0.7, which exposes the individuals at the site boundary and beyond to contaminated soil for two-thirds of a day. The worker and NPA exposures are as discussed in Section 2.8 of this Appendix.

Ingestion Data

- Ingestion numbers will be reduced by a factor of 10 to account for only 10-percent of the food consumed being grown locally (such as in a person's garden). Milk consumption was reduced to 30 percent except for infants.
- Since the worker takes immediate action during accidents, it was modeled that the worker did not consume any food products.
- The analysis used the following changes from RSAC-7.2 defaults.
  - Annual Dietary Consumption Rates(adults):
    - ❖ 16.4 kilograms per year (kg/yr) Stored Vegetables
    - ❖ 1.53 kg/yr Leafy Vegetables
    - ❖ 7.99 kg/yr Meat
    - ❖ 31.8 l/yr Milk

3.2.1 Fire Analysis

In this hypothetical accident scenario, the analysis postulates a fire in a radiological support facility. The fire spreads to radioactive material, which results in an airborne release of particulate.

Conditions used in developing the source term are as follows:

- The basis of the source term is 1.0 Curie of ^{60}Co and the proportional amounts of other radioactive elements expected to be present with ^{60}Co.
- The release to the environment occurs at a constant rate over 15 minutes.
- There is no increase in direct radiation due to this accident.
- The amounts of radionuclides released to the environment are shown in Table D-9. This listing includes nuclides that result in at least 99-percent of the possible exposure.

Table D-9 Radionuclides Released to the Environment

Radionuclides	**Release (Curies)**		**Radionuclides**	**Release (Curies)**	
	Fire and Liquid Spill	*Purification Media Spill*		*Fire and Liquid Spill*	*Purification Media Spill*
^{14}C	1.5 x 10^{-2}	3.0 x 10^{-2}	^{90}Sr	5.0 x 10^{-3}	4.0 x 10^{-4}
^{54}Mn	8.6 x 10^{-1}	1.6 x 10^{-1}	^{94}Nb	2.0 x 10^{-4}	4.0 x 10^{-4}
^{55}Fe	1.0	2.0	^{99}Tc	9.0 x 10^{-3}	8.0 x 10^{-4}
^{58}Co	1.1 x 10^{-1}	3.8 x 10^{-1}	^{110m}Ag	9.0 x 10^{-3}	1.2 x 10^{-2}
^{60}Co	1.0	2.0	^{125}Sb	4.0 x 10^{-2}	1.0 x 10^{-2}
^{59}Ni	8.0 x 10^{-4}	1.6 x 10^{-3}	^{129}I	4.0 x 10^{-6}	4.0 x 10^{-7}
^{63}Ni	8.0 x 10^{-2}	1.6 x 10^{-1}	^{134}Cs	1.0 x 10^{-2}	8.0 x 10^{-4}
^{65}Zn	4.0 x 10^{-2}	1.6 x 10^{-2}	^{137}Cs	9.0 x 10^{-2}	8.0 x 10^{-3}

Table D-10 summarizes the public health risk to the general population that might result from the hypothetical support facility fire accident. Table D-10 presents the results for the design basis accident with 95-percent meteorology. The estimated total probability of occurrence of an event leading to a fire in the support facility is in the range of 4 x 10^{-3} to 5 x 10^{-3} per year (Ganti and Krasner 1984). A value of 5 x 10^{-3} was used in the analysis to develop the risk results in Table D-9. The analyses showed that no additional cancers are expected in the public, even for this severe hypothetical radiological fire. The average annual individual risk of a cancer to the general public living within a 50-mile radius of NPTU Charleston due to a fire is less than one in 740 billion.

Table D-10 Summary of Radiological Support Facility Fire Results

Location	Total Radiation Exposure to Affected Population From a Fire[1]	Annual Risk of Single Cancer in Entire Affected Population From a Fire[2]	Population Estimate Within 50 Miles of NPTU Charlestion[3]	Average Annual Risk of a Cancer to a Member of the General Population From a Fire[4]	Individual Annual Risk of a Cancer for a Maximally Exposed Off-Site Individual From a Fire[5]	An Individual's Annual Cancer Incidences[6]
NPTU Charleston	320 person-rem	1 in 1,140 (8.8×10^{-4})	648,975	1 in 740 million (1.4×10^{-9})	1 in 9 million (1.1×10^{-7})	1 in 193 (5.2×10^{-3})

Notes:
1. This is the total exposure to affected population within a 50-mile radius of the facility due to a fire (person-rem).
2. Annual risk of a single cancer in the affected population within a 50 mile radius of the facility from radiation exposure due to a fire is calculated by multiplying the total radiation exposure to affected population (rem) by 0.00055 cancers estimated to be caused by each rem by a 1 in 200 (0.005) probability of a fire. See Table D-3 in Appendix D.
3. This is the estimated number of people within a 50-mile radius of the facility from census data from Table D-4.
4. Average annual risk of cancer for an average individual within a 50-mile radius of the facility from radiation exposure due to a fire is calculated by dividing the affected population cancer risk by the number of people within a 50-mile radius of NPTU Charleston. Risk of cancer is noted in parentheses. 5. The MOI is a theoretical individual living at the base boundary receiving maximum exposure. Risk is calculated by multiplying the total radiation exposure to the MOI (rem, see Table D-11 of Appendix D) by 0.00055 cancers estimated to be caused by each rem (see Table D-3 in Appendix D) by a 1 in 200 (0.005) probability of a fire.
6. This is the annual risk of an individual cancer. Risk of cancer is noted in parentheses.

For the hypothetical support facility fire scenario, the radioactive plume might result in contamination of the ground to a downwind distance of 0.25 mile. This would yield a total area impacted by the accident of approximately 8 acres. The calculated downwind distance would be contained within the boundary of the base in an area controlled by NPTU Charleston during radiological events. Detailed results are contained in Table D-10. The probability of a fire occurring (5×10^{-3}) is not included in the calculations for Worker, NPA, and MOI in Table D-11.

Table D-11 Analysis Results for Radiological Support Facility Fire, Assuming Fire Occurs

Location	**Individual**	**Total EDE (rem)**	**Likelihood of Cancer**
NPTU Charleston	Worker	6.7×10^{-1}	2.7×10^{-4} (1 in 3,700)
	NPA	2.4×10^{-1}	1.3×10^{-4} (1 in 7,700)
	MOI	3.0×10^{-1}	1.7×10^{-4} (1 in 6,000)
	Total Radiation Exposure to Affected Population From a Fire[1]	***Number of Cancers in Affected Population***	***Annual Risk of Single Cancer in Entire Affected Population From a Fire[2]***
NPTU Charleston	320 person-rem	1.8×10^{-1}	8.8×10^{-4} (1 in 1,140)

Notes:
1. This is the total exposure to affected population within a 50-mile radius of the facility due to a fire (person-rem).
2. This is the annual risk of cancer in the affected population within a 50-mile radius of the facility from radiation exposure due to a fire.

3.2.2 Purification Media Spill Analysis

In this hypothetical accident scenario, the contents of a purification media transfer hose are spilled into the waters surrounding an MTS during the transfer of the media from the MTS to a shipping container due to a rupture of the hose and failure of all engineered safety features that are designed to capture any leakage from the hose. This scenario is conservative since this operation would only occur once for each MTS and could be performed in a dry-dock rather than pier-side. Significant engineering controls are established prior to performing this operation and the transfer would be performed in verbatim compliance with written procedures under the direct oversight of management and safety organizations. The transfer operation would be suspended if severe weather were forecasted in the NPTU Charleston area. The scenario assumes that all the contents are spilled into the surrounding water rather than into the ship, containment devices, or the transportation cask. The amount of activity release is conservatively estimated to be 2.0 Curie of ^{60}Co and the proportional amounts of other radioactive elements expected to be present with the ^{60}Co in this media.

Conditions used in developing the source term are as follows:

- The basis for the source term is 2.0 and the proportional amounts of other radioactive elements expected to be present with the ^{60}Co in this media.
- Table A-9 lists the amounts of radionuclides released to the environment. This listing includes nuclides that result in at least 99-percent of the possible exposure.

Table D-12 summarizes the public health risk to the general population that might result from the hypothetical release of radioactive purification media accident. Table D-12 presents the results for the design basis accident with 95-percent meteorology. The estimated total probability of occurrence of an event leading to the release of purification media is in the range of 10^{-4} to 10^{-8} per year. A value of 10^{-4} was used in the analysis to develop the risks in Table D-12. The analyses showed no additional cancers in the public, even for this severe hypothetical radioactive water purification media spill. The average annual individual risk of a cancer to the public living within a 50-mile radius of NPTU Charleston is very low, less than one in 360 billion. Detailed results are contained in Table D-13. The probability of a purification media spill occurring (10^{-4}) is not included in the calculations of Worker, NPA, and MOI in Table D-13.

Table D-12 Summary of Radiological Support Operations Release of Radioactive Purification Media Results

Location	Total Radiation Exposure to Affected Population From a Spill[1]	Annual Risk of Single Cancer in Entire Affected Population From a Spill[2]	Population Estimate Within 50 Miles of NPTU Charlestion[3]	Average Annual Risk of Cancer to a Member of the General Population From a Spill[4]	Individual Annual Risk of Cancer for a Maximally Exposed Off-Site Individual From a Spill[5]	An Individual's Annual Risk of Cancer Incidences[6]
NPTU Charleston	33 person-rem	1 in 550,000 (1.8×10^{-6})	648,975	1 in 360 billion (2.8×10^{-12})	1 in 170 billion (6.0×10^{-12})	1 in 193 (5.2×10^{-3})

Notes:

1. This is the total exposure to affected population within a 50-mile radius of the facility due to a spill (person-rem).
2. Annual risk of a single cancer in the affected population within a 50-mile radius of the facility from radiation exposure due to a spill is calculated by multiplying the total radiation exposure to affected population (rem) by 0.00055 cancers estimated to be caused by each rem by a 1 in 10,000 (0.0001) probability of a spill. (See Table D-3 in Appendix D.)
3. This is the estimated number of people within a 50-mile radius of the facility from census data from Table D-4.
4. Average annual risk of cancer for an average individual within a 50-mile radius of the facility from radiation exposure due to a spill is calculated by dividing the total population cancer risk by the number of people within a 50-mile radius of NPTU Charleston. Risk of cancer is noted in parentheses.
5. The MOI is a theoretical individual living at the base boundary receiving maximum exposure. Risk is calculated by multiplying the total radiation exposure to the MOI (rem, see Table D-11 of Appendix D) by 0.00055 cancers estimated to be caused by each rem (see Table D-3 in Appendix D) by a 1 in 10,000 (0.0001) probability of a spill.
6. This is the annual risk of an individual cancer incidence. Risk of cancer is noted in parentheses.

Table A-13. Analysis Results for Release of Radioactive Purification Media from Radiological Support Operations, Assuming Spill Occurs

Location	Individual	Total EDE (rem)	Likelihood of Cancer
NPTU Charleston	Worker	N/A	N/A
	NPA	4.8×10^{-5}	2.6×10^{-8} (1 in 38 million)
	MOI	1.1×10^{-4}	6.0×10^{-8} (1 in 17 million)
	Total Radiation Exposure to Affected Population from an Operations Spill[1]	***Number of Cancers in General Population***	***Annual Risk of Single Cancer in Entire Affected Population From a Spill[2]***
NPTU Charleston	33 person-rem	1.8×10^{-2}	1.8×10^{-6} (1 in 550,000)

Notes:

1. This is the total exposure to affected population within a 50-mile radius of the facility due to a spill (person-rem).
2. This is the annual risk of cancer in the affected population within a 50-mile radius of the facility from radiation exposure due to a spill.

3.2.3 Radioactive Liquid Spill Analysis

In this hypothetical accident scenario, the entire contents of a storage tank are spilled into the water surrounding the radiological support facility due to a severe rupture. This amount was used to conservatively bound the amount of activity released to 1.0 Curie of ^{60}Co and the proportional amounts of other radioactive elements expected to be present with ^{60}Co. The scenario is conservative since it would require a spill of over 3 million gallons of radioactive liquid at levels normally contained in collection facilities that have tanks no larger than 6,000 gallons. Furthermore, the total capacity to store radioactive liquid at NPTU Charleston would be less than 22,000 gallons.

Conditions used in developing the source term are as follows:

- The basis for the source term is 1.0 Curie of ^{60}Co and the proportional amounts of other radioactive elements expected to be present with the ^{60}Co.
- Table D-9 lists the amounts of radionuclides released to the environment. This listing includes nuclides that result in at least 99-percent of the possible exposure.

Table D-14 summarizes the public health risk to the general population that might result from the hypothetical release of radioactive liquid accident. Table D-14 presents the results for the design basis accident with 95-percent meteorology. The estimated total probability of occurrence of an event leading to a release of radioactive liquid is in the range of 10^{-4} to 10^{-8} per year. A value of 10^{-4} was used in the analysis to develop the risks in Table D-14. The analyses showed that no additional cancers in the public, even for this severe hypothetical radioactive liquid release. The average annual individual risk of a cancer to the public living within a 50-mile radius of NPTU Charleston is very low, less than one in 490 billion. Detailed results are contained in Table D-15. The probability of a spill occurring (10^{-4}) is not included in the calculations of Worker, NPA, and MOI in Table D-15.

Table D-14 Summary of Radiological Support Facility Release of Radioactive Liquid Results

Location	Total Radiation Exposure to Affected Population From a Spill[1]	Annual Risk of Single Cancer in Entire Affected Population From a Spill[2]	Population Estimate Within 50 Miles of NPTU Charleston[3]	Average Annual Risk of Cancer to a Member of the General Population From a Spill[4]	Individual Annual Risk of Cancer for a Maximally Exposed Off-Site Individual From a Spill[5]	An Individual's Annual Risk of Cancer Incidences[6]
NPTU Charleston	24 person-rem	1 in 750,000 (1.3×10^{-6})	648,975	1 in 490 billion (2.1×10^{-12})	1 in 250 billion (3.9×10^{-12})	1 in 193 (5.2×10^{-3})

Notes:
1. This is the total exposure to affected population within a 50-mile radius of the facility due to a spill (person-rem).
2. Annual risk of a single cancer in the affected population within a 50-mile radius of the facility from radiation exposure due to a spill is calculated by multiplying the total radiation exposure to affected population (rem) by 0.00055 cancers estimated to be caused by each rem by a 1 in 10,000 (0.0001) probability of a spill. See Table D-3 in Appendix D.
3. This is the estimated number of people within a 50-mile radius of the facility from census data from Table D-4.
4. Average annual risk of cancer for an average individual within a 50-mile radius of the facility from radiation exposure due to a spill is calculated by dividing the total population cancer risk by the number of people within a 50-mile radius of NPTU Charleston. Risk of cancer is noted in parentheses.
5. The MOI is a theoretical individual living at the base boundary receiving maximum exposure. Risk is calculated by multiplying the total radiation exposure to the MOI (rem, see Table D-11 of Appendix D) by 0.00055 cancers estimated to be caused by each rem (see Table D-3 in Appendix D) by a 1 in 10,000 (0.0001) probability of a spill.
6. This is the annual risk of an individual cancer incidence. Risk of cancer is noted in parentheses.

Table D-15 Analysis Results for Release of Radiological Liquid From a Radiological Support Facility, Assuming Spill Occurs

Location	**Individual**	**Total EDE (rem)**	**Likelihood of Cancer**
NPTU Charleston	Worker	N/A	N/A
	NPA	$2.9x 10^{-5}$	1.6×10^{-8} (1 in 29 million)
	MOI	7.2×10^{-5}	3.9×10^{-8} (1 in 25 million)
	Total Radiation Exposure to Affected Population From a Facility Spill[1]	***Number of Cancers in General Population***	***Annual Risk of Single Cancer in Entire Affected Population From a Spill, Including Probability of Spill Occurring[2]***
NPTU Charleston	24 person-rem	1.3×10^{-2}	1.3×10^{-6} (1 in 750,000)

Notes:

1. This is the total exposure to affected population within a 50-mile radius of the facility due to a spill (person-rem).
2. This is the annual risk of cancer in the affected population within a 50-mile radius of the facility from radiation exposure due to a spill.

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APPENDIX E

WETLAND SURVEY REPORT

Naval Nuclear Power Training Unit – Charleston
Joint Base Charleston, South Carolina

NPTU Charleston Facilities Expansion
Wetland Delineation

April 2012

Prepared for:

Naval Facilities Engineering Command Southeast
NAS Jacksonville, Code: EV-21
Jacksonville, Florida 32212-0030

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Appendices

Acronyms and Abbreviations

MTS	Moored Training Ship
NPTU	Nuclear Power Training Unit
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
USGS	United States Geological Survey

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1.0 SITE INFORMATION

The Nuclear Power Training Unit (NPTU) is located on Old Tom Road adjacent to the west bank of the Cooper River (Figures 1 and 2, Appendix A). The existing site includes two piers, Moored Training Ships (MTSs), support barges, training support facilities, and parking areas. The parking areas are located adjacent to the secure NPTU facility and on the west side Old Tom Road. A sanitary lift station with two support buildings is also located in the large parking area on the west side of Old Tom Road.

The approximately 72-acre study area includes the existing NPTU facility and adjacent forested and tidal marsh areas. The site is generally bounded by undeveloped land and the Red Bank Golf Course to the north, undeveloped land to the west, and the Cooper River the east and south.

2.0 DELINEATION METHODOLOGY

Prior to the field investigation, existing information was reviewed including United States Geological Survey (USGS) mapping, Natural Resource Conservation Service (NRCS) soils mapping, United States Fish and Wildlife Service National Wetland Inventory (NWI) mapping, and available aerial photography. In addition, The National Oceanic and Atmospheric Administration and the South Carolina Department of Natural Resources have classified the current climatic condition as moderate to severe drought. NRCS, NWI, and drought mapping information are found in Appendix B.

The study area was delineated using the methodology outlined in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (version 2.0, November 2010). The wetland boundary was flagged using pink and black stripe tape, and the flags were located using Global Positioning System Units (Trimble Geo XT) and differentially corrected to sub-meter horizontal accuracy. A subsequent survey was conducted in January 2012 to locate any flags that were relocated during the Army Corps of Engineers wetland delineation confirmation. The limits of flagged confirmed wetlands are illustrated on Figure 3, Appendix A. The wetland areas classified by the Cowardin classification are represented on Figure 4, Appendix A.

Data were collected at specific data points to represent the area. The data points are identified on Figure 3 and the data sheets that are included in Appendix C.

3.0 DELINEATION RESULTS

The existing NRCS soils data identified two hydric soils in the study area and three soil types that have hydric inclusions. The two hydric soils are Bohicket association and Capers association. The remaining three soils types, Chipley-Echaw complex, Goldsboro loamy sand, and Lynchburg fine sandy loam, all have hydric inclusions. The NWI mapping identified palustrine forested, palustrine scrub shrub, palustrine emergent, estuarine intertidal, and sub tidal habitats in the study area.

The onsite investigation identified potential wetland areas, some corresponding to hydric soils and wetlands identified on the NRCS and NWI mapping, and some that were not identified on the existing mapping. The wetlands lie within areas of little topographic relief and in areas associated with tidal action.

The dominant vegetation within the palustrine wetlands is loblolly pine (*Pinus taeda*), red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), privet (*Ligustrum sinense*), Chinese tallow tree (*Sapium sebiferum),* wax myrtle (M*yrica cerifera*), and cinnamon fern (*Osmunda cinnamomea*). The dominant vegetation within the tidal marsh areas is smooth chordgrass (*Spartina alterniflora*), salt meadow chordgrass (*Spartina patens*) and black needlerush (*Juncus roemerianus*). Invasive species such as the privet, wisteria (*Wisteria frutescens*), and Chinese tallow tree were extremely common throughout the study area.

Hydric soils were identified and used as a strong indicator of the upland/wetland boundary. Direct observations of hydrology including surface flow and soil saturation were observed in the potential wetland areas, as well as indirect indicators, such as signs of stained leaves. In addition, tidal flows were observed passing through the culvert system into the two small wetlands located between Old Tom Road and the existing parking adjacent to the NPTU buildings. These tidal flows were also observed coming out of the drop inlets located around the two wetlands.

4.0 SUMMARY

The potential wetland areas, classified by the Cowardin classification system and assigned acreages are presented in Table 1 below.

Table 1. NPTU Expansion Wetland Delineation Habitat Types

Cowardin Classification[1]	*Cowardin Description*	*Acreage[2]*	*Quality[3]*	*Comments*
E2EM1N	Estuarine Intertidal Emergent Persistent Regularly Flooded	3.78	Exhibits few signs of disturbance.	*Spartina* marsh
E2SB5N	Estuarine Intertidal Stream Bed Mud Regularly Flooded	0.22	Fairly undisturbed.	Tidal channel
E2EM1Nh3	Estuarine Intertidal Emergent Persistent Regularly Flooded Diked/Impounded Brackish	2.19	Restricted tidal range through culverts.	Brackish marsh
PEM1N	Palustrine Emergent Persistent Regularly Flooded	0.62	Restricted tidal range through culverts.	Freshwater marsh
PFO1C	Palustrine Forested Deciduous/ Needle Leaved Deciduous Seasonally Flooded	16.72	Understory dominated by invasive species.	Forested wetland
E2FO1Ph3	Estuarine Intertidal Forested Broad Leaved Deciduous Irregularly Flooded Diked Impounded Brackish	1.60	During high tide events, water back-flushes through system and exits storm drain culverts and drop inlets. Understory dominated by invasive species.	Forested wetland
TOTAL		**25.13**		

Notes:
[1]The classification of Wetland and Deepwater Habitats of the United States, Lewis M Cowardin, 1979, FWS/OBS-79/31.
[2]The acreages of each habitat type are calculated from within the NPTU Scoped Wetland Delineation project limits.
[3]The quality is based on observations and no formal functional assessment was conducted.

5.0 CORPS CONFIRMATION

A draft report was submitted to the Army Corps of Engineers, Charleston District (or Corps) in November 2011; a field review was conducted on December 13, 2011; and a follow up meeting was held on January 18, 2012. It was determined at the second meeting that a field survey of the wetland flags, signed by a licensed South Carolina surveyor, would be prepared and submitted to the Corps for final approval. This survey was conducted and report prepared by Reid Surveying (Appendix D). An electronic copy of the survey is attached as well as a signed hard copy of the survey.

A copy of the Army Corps of Engineers Confirmation Letter, dated April 2, 2012 is attached in Appendix E. The wetland confirmation is valid for 5 years from the date of the letter.

APPENDIX A PROJECT FIGURES

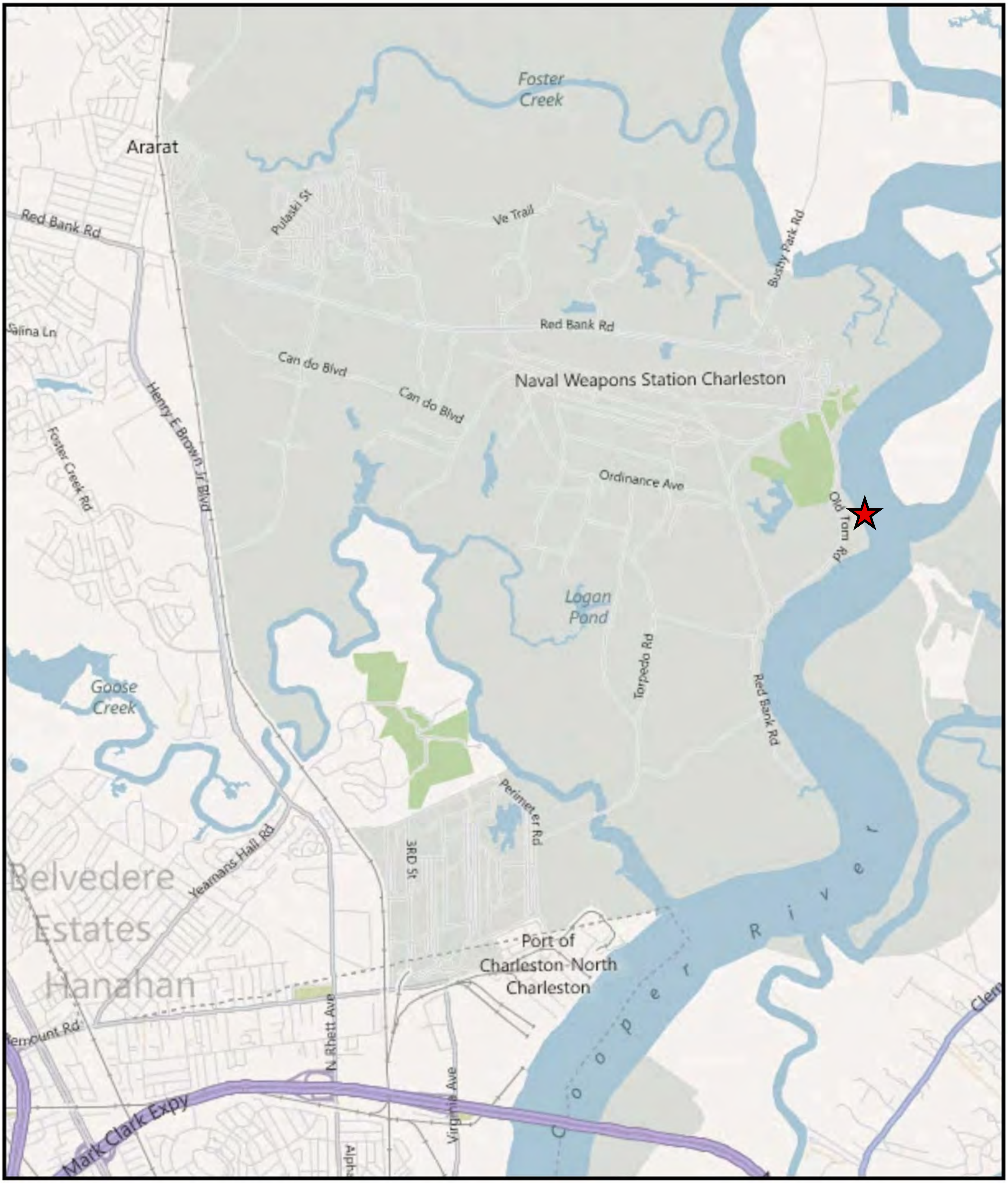


Figure 1. General Project Location

Legend

★ Project Location

N

0 0.25 0.5 1 1.5 2 Miles

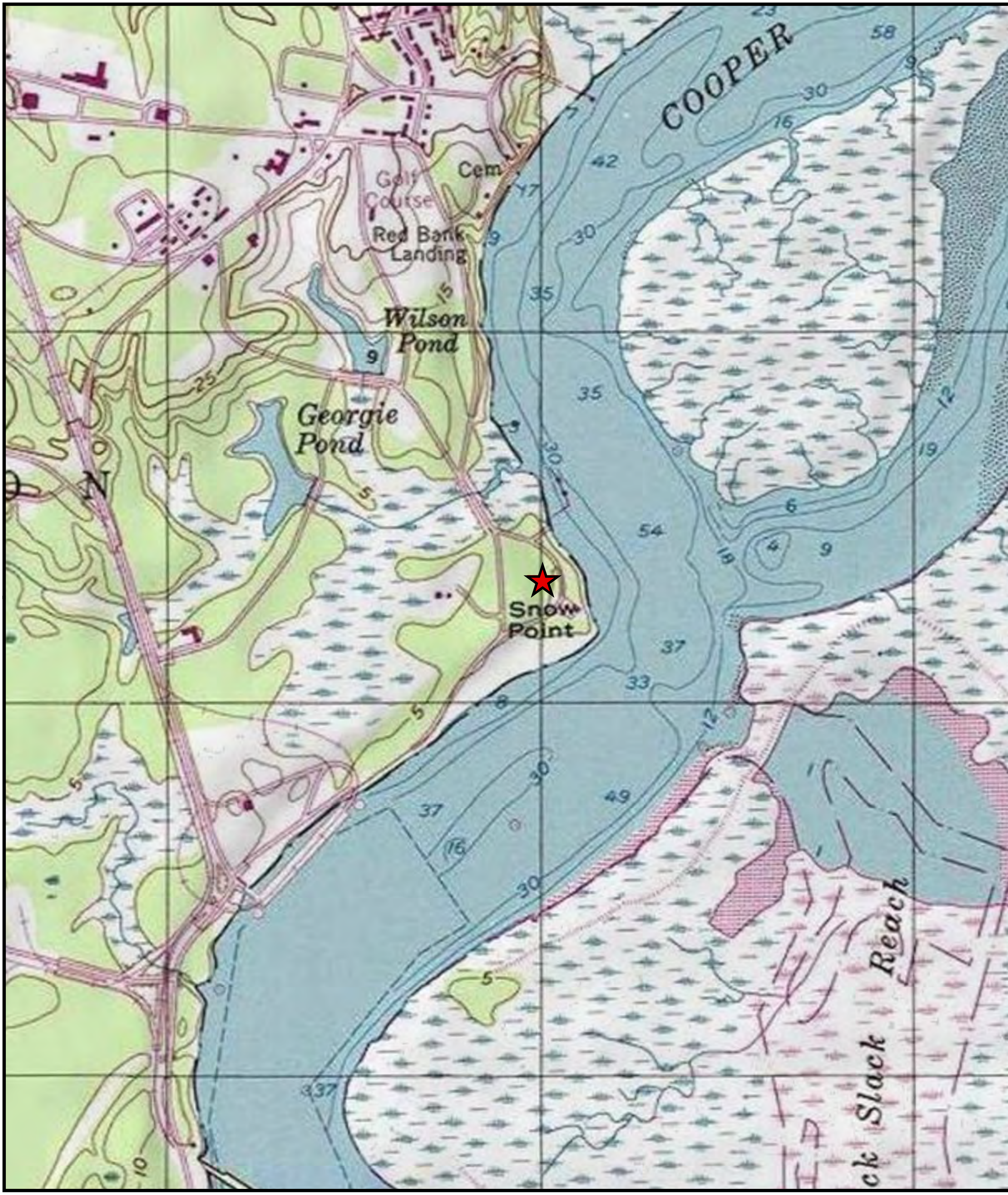


Figure 2. USGS Location Map, North Charleston, SC Quadrangle

Legend

★ Project Location

0 375 750 1,500 2,250 3,000 Feet

N

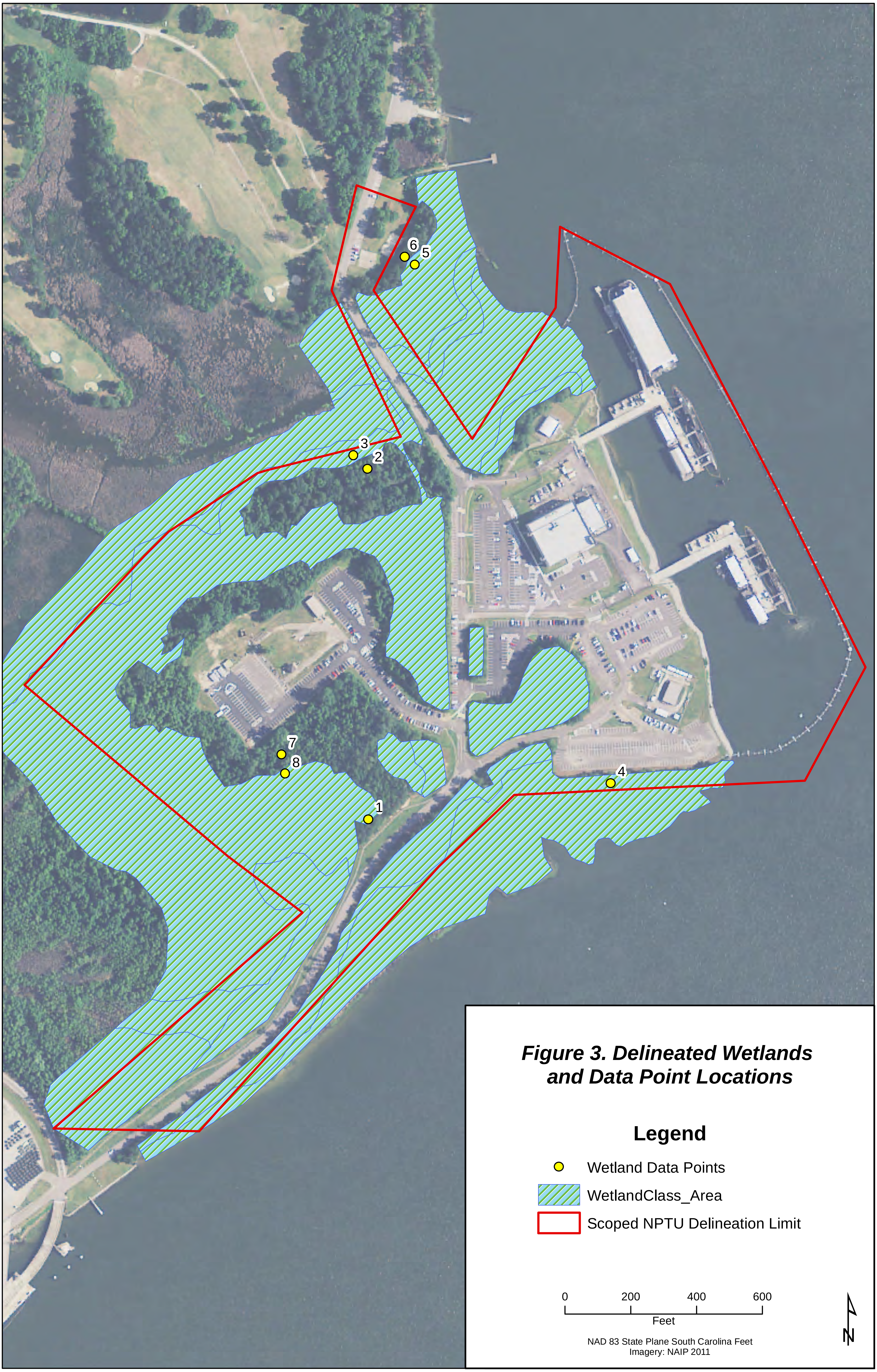


Figure 3. Delineated Wetlands and Data Point Locations

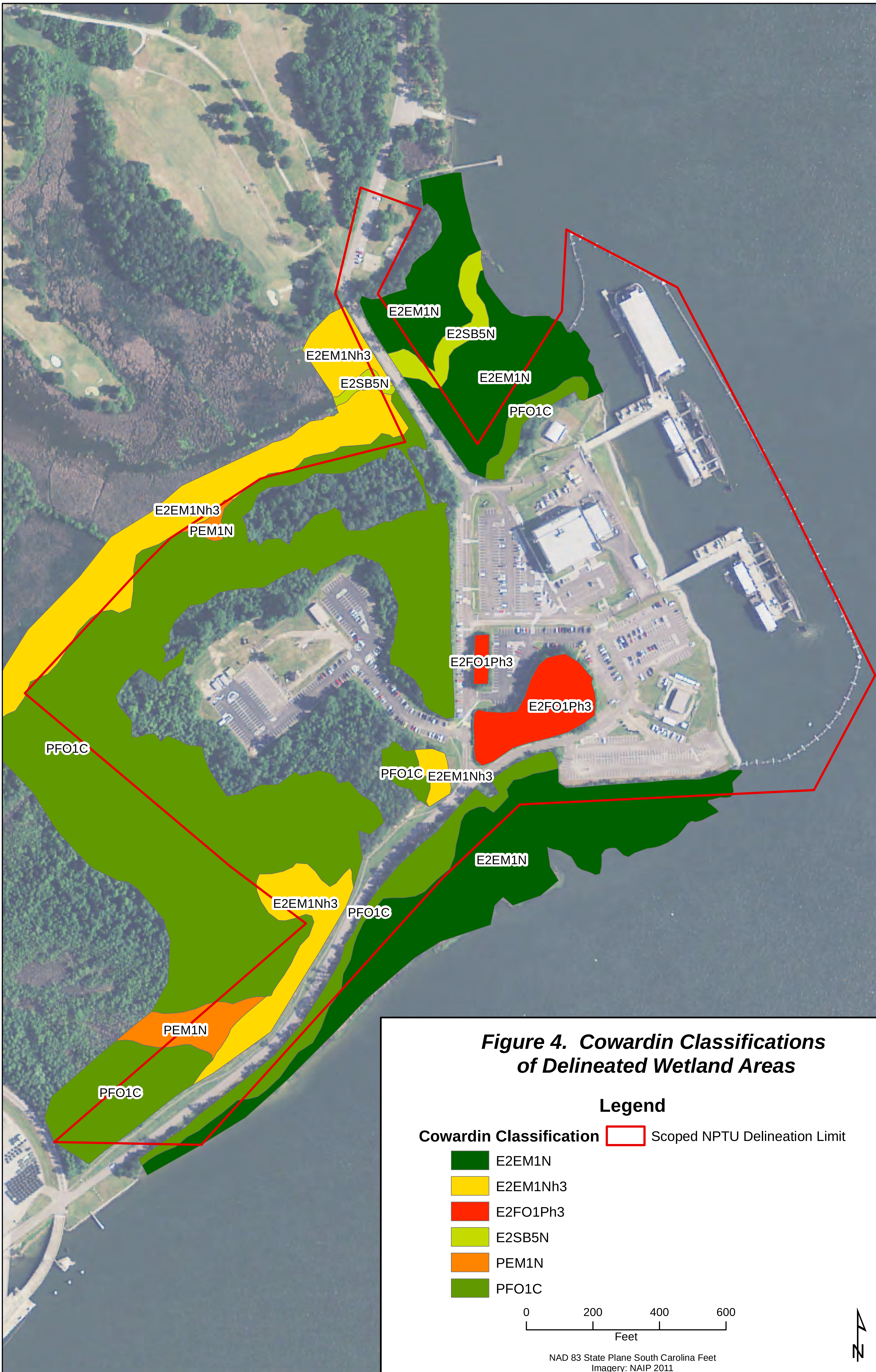
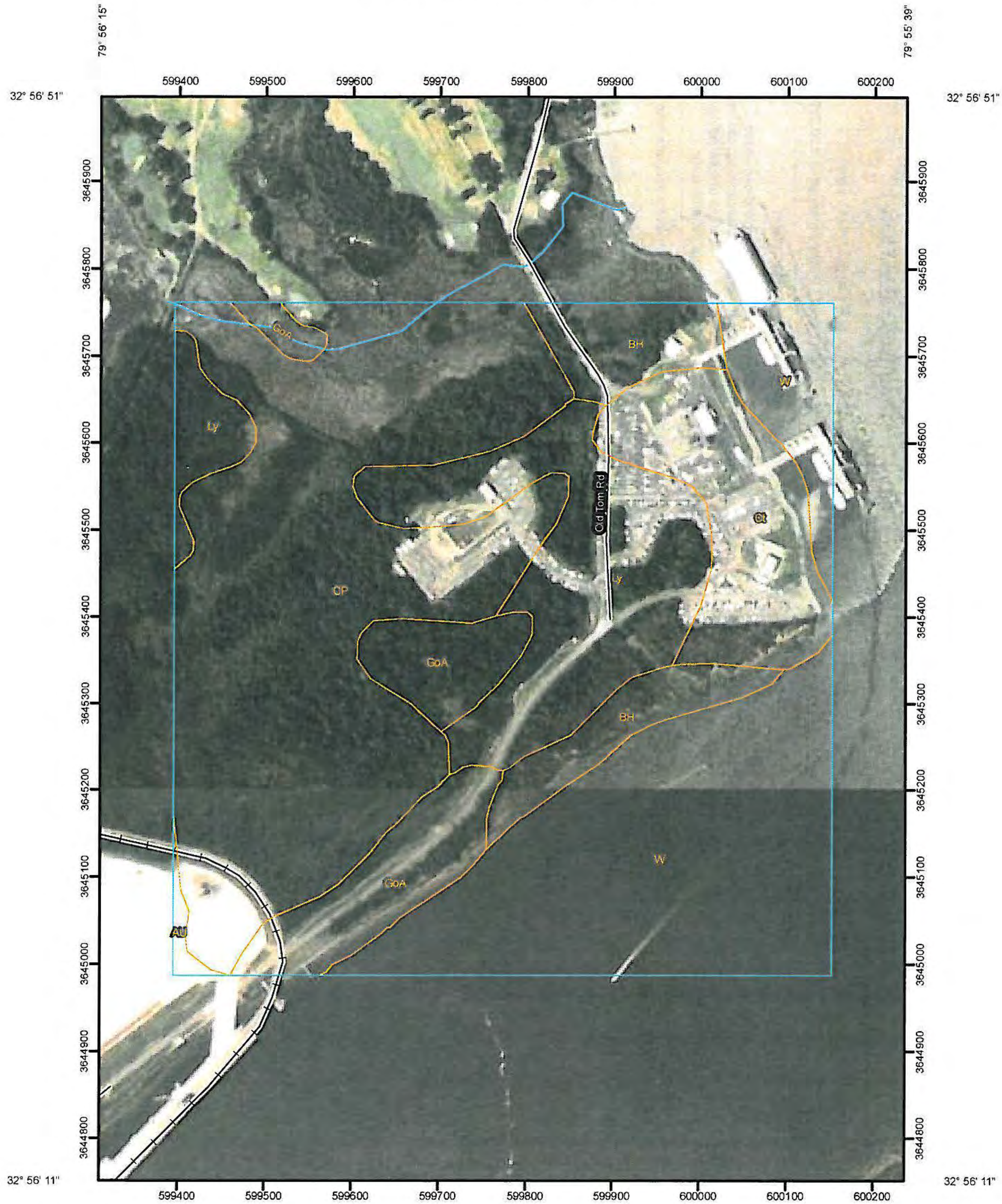


Figure 4. Cowardin Classifications of Delineated Wetland Areas

APPENDIX B NRCS, NWI, AND DROUGHT MAPPING INFORMATION

Soil Map—Berkeley County, South Carolina



Map Scale: 1:5,940 if printed on A size (8.5" x 11") sheet

N

0 50 100 200 300 Meters

0 200 400 800 1,200 Feet

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:5,940 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Berkeley County, South Carolina
Survey Area Data: Version 7, Feb 2, 2010

Date(s) aerial images were photographed: 7/21/2005; 6/9/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Berkeley County, South Carolina (SC015)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AU	Aquic Udifluvents	0.6	0.4%
BH	Bohicket association	9.2	6.3%
CP	Capers association	52.7	36.4%
Ct	Chipley-Echaw complex	12.4	8.6%
GoA	Goldsboro loamy sand, 0 to 2 percent slopes	12.1	8.3%
Ly	Lynchburg fine sandy loam	21.9	15.1%
W	Water	36.1	24.9%
Totals for Area of Interest		**145.0**	**100.0%**

U.S. Fish and Wildlife Service

National Wetlands Inventory

NPTU Infrastructure Improvements

Aug 11, 2011

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Status

- Digital
- Scan
- Non-Digital
- No Data

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

Forecasts | What's New | Current Conditions | About Us | Archive | Contact Us | Links

Return to U.S. Drought Monitor   Return to Region

The data cutoff for Drought Monitor maps is Tuesday at 7 a.m. Eastern Standard Time. The maps, which are based on analysis of the data, are released each Thursday at 8:30 a.m. Eastern Time.

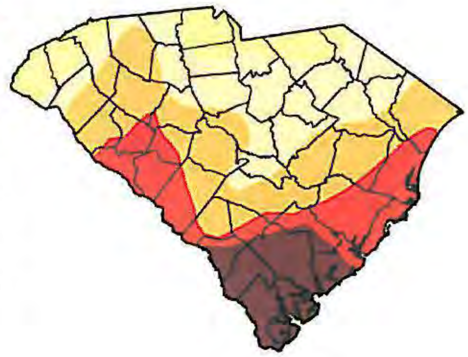
U.S. Drought Monitor

February 28, 2012
Valid 7 a.m. EST

South Carolina

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	88.91	62.34	30.86	12.13
Last Week (02/21/2012 map)	0.00	100.00	88.91	62.34	30.86	12.13
3 Months Ago (11/29/2011 map)	0.96	99.04	82.19	42.77	23.30	0.00
Start of Calendar Year (12/27/2011 map)	2.37	97.63	82.55	41.61	23.30	0.00
Start of Water Year (09/27/2011 map)	0.00	100.00	74.04	52.32	29.90	0.00
One Year Ago (02/22/2011 map)	16.51	83.49	48.46	9.02	0.00	0.00



Intensity:

D0 Abnormally Dry
D1 Drought - Moderate
D2 Drought - Severe
D3 Drought - Extreme
D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, March 1, 2012
Mark Svoboda, National Drought Mitigation Center

PDF   Tabular Statistics   About the DIR

For local details and impacts, please contact your State Climatologist or Regional Climate Center.

The data cutoff for Drought Monitor maps is Tuesday at 7 a.m. Eastern Standard Time. The maps, which are based on analysis of the data, are released each Thursday at 8:30 a.m. Eastern Time.

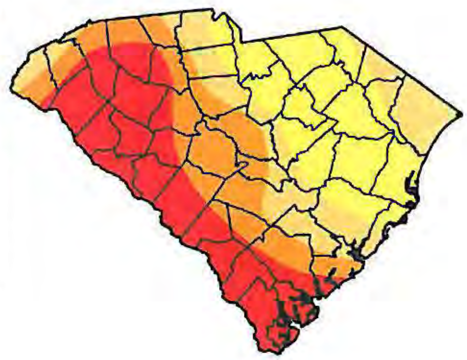
U.S. Drought Monitor

September 13, 2011
Valid 7 a.m. EST

South Carolina

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	73.25	51.79	29.89	0.00
Last Week (09/06/2011 map)	7.61	92.39	61.30	41.12	8.87	0.00
3 Months Ago (06/14/2011 map)	1.22	98.78	48.88	20.74	9.94	0.00
Start of Calendar Year (12/28/2010 map)	6.18	93.82	45.81	0.00	0.00	0.00
Start of Water Year (09/28/2010 map)	24.11	75.89	24.63	0.00	0.00	0.00
One Year Ago (09/07/2010 map)	69.04	30.96	1.41	0.00	0.00	0.00



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

Released Thursday, September 15, 2011
Mark Svoboda, NDMC

PDF Tabular Statistics About the DIR

For local details and impacts, please contact your State Climatologist or Regional Climate Center.

APPENDIX C DATA SHEETS

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: NPTU Joint Base Charleston City/County: N. Charleston/Berkley Sampling Date: 08-18-11

Applicant/Owner: Air Force State: SC Sampling Point: DP-1

Investigator(s): John Lowenthal Section, Township, Range: ______

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR or MLRA): LRRT Lat: 32-56-36.22N Long: 79-55-53.42 Datum: ______

Soil Map Unit Name: Lynchburg fine sandy loam NWI classification: upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____		Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present? Yes X No ____		
Wetland Hydrology Present? Yes X No ____		

Remarks:

Overall study area has been disturbed over time. Also, NOAA has this portion of Berkeley County identified as having moderate to severe drought status.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ______

Water Table Present? Yes ____ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): 10

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 5 days after rainfall event.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-1

Tree Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	55	yes	fac
2. Liquidambar styraciflua	10		fac
3. Acer rubrum	10		fac
4. Quercus phellos	10		facw
5.			
6.			
7.			
8.			
	95 = Total Cover		

50% of total cover: 47.5 20% of total cover: 19

Sapling/Shrub Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	20	yes	fac
2. Liquidambar styraciflua	15	yes	fac
3. Myrica cerifera	10		fac
4. Ligustrum sinense	15	yes	fac
5.			
6.			
7.			
8.			
	60 = Total Cover		

50% of total cover: 30 20% of total cover: 12

Herb Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	5	yes	fac
2. carex sp.	5	yes	??
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10 = Total Cover		

50% of total cover: 5 20% of total cover: 2

Woody Vine Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5YR 3/1	100					sandy loam	
3-10	2.5Y 4/2	90	7.5 YR 3/4	10	C	M	sandy loam	
10-16	2.5Y 6/2	90	7.5 YR 3/6	10	C	M	sandt clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: __________

Depth (inches): __________

Hydric Soil Present? Yes ______ **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: NPTU Joint Base Charleston City/County: N. Charleston/Berkley Sampling Date: 08-18-11

Applicant/Owner: Air Force State: SC Sampling Point: DP-2

Investigator(s): John Lowenthal Section, Township, Range: ______

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR or MLRA): LRRT Lat: 32-56-36.22N Long: 79-55-53.42 Datum: ______

Soil Map Unit Name: Bohicket association NWI classification: wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

Overall study area has been disturbed over time. Also, NOAA has this portion of Berkeley County identified as having moderate to severe drought status.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 10

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 5 days after rainfall event.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Nyssa sylvatica	35	yes	fac
2. Liquidambar styraciflua	15	yes	fac
3. Acer rubrum	20	yes	fac
4.			
5.			
6.			
7.			
8.			
	70	= Total Cover	
50% of total cover: 35	20% of total cover: 14		

Sapling/Shrub Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ligustrum sinense	25	yes	fac
2. Triadica sebifera	10	yes	NL
3.			
4.			
5.			
6.			
7.			
8.			
	35	= Total Cover	
50% of total cover: 17.5	20% of total cover: 7		

Herb Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Boehmeria cylindrica	12	yes	facw
2. Microstegium vimineum	15	yes	fac
3. Osmundia cinnamomea	10	yes	facw
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	37	= Total Cover	
50% of total cover: 18.5	20% of total cover: 7.4		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Toxicodendron radicans	2	yes	fac
2.			
3.			
4.			
5.			
	2	= Total Cover	
50% of total cover: 2	20% of total cover: 0.4		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR 3/2	100					loam	
4-10	2.5Y 5/2	95	10YR 4/6	5	C	M	clay loam	
10-16	2.5Y 4/2	90	10TY 4/6	10	C	M	sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____

Depth (inches): ____

Hydric Soil Present? Yes X No ____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: NPTU Joint Base Charleston City/County: N. Charleston/Berkley Sampling Date: 08-19-11

Applicant/Owner: Air Force State: SC Sampling Point: DP-3

Investigator(s): John Lowenthal Section, Township, Range: ______

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR or MLRA): LRRT Lat: 32-56-36.22N Long: 79-55-53.42 Datum: ______

Soil Map Unit Name: Bohickett association/Chipley Echaw complex NWI classification: upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

Overall study area has been disturbed over time. Also, NOAA has this portion of Berkeley County identified as having moderate to severe drought status.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 6 days after rainfall event.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Myrica cerifera	25	yes	fac
2. Ligustrum sinense	20	yes	fac
3.			
4.			
5.			
6.			
7.			
8.			
	45 = Total Cover		
50% of total cover: 22.5		20% of total cover: 9	

Herb Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Parthenocissus quinquefolia	7	yes	fac
2. Wisteria frutescens	10	yes	Facw
3.			
4.			
5.			
	17 = Total Cover		
50% of total cover: 8.5		20% of total cover: 3.4	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ____ No ____

Remarks: (If observed, list morphological adaptations below).

Vegetation is highly disturbed.

SOIL

Sampling Point: DP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y 7/3	100					sandy loam	
5-12	2.5Y 7/4	100					sandy loam	
12-16	2.5Y 7/3	90	7.5YR 6/4	10	C	M	sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ____ **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: NPTU Joint Base Charleston City/County: N. Charleston/Berkley Sampling Date: 08-19-11

Applicant/Owner: Air Force State: SC Sampling Point: DP-4

Investigator(s): John Lowenthal Section, Township, Range: ______

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR or MLRA): LRRT Lat: 32-56-36.22N Long: 79-55-53.42 Datum: ______

Soil Map Unit Name: Chipley Echaw complex NWI classification: wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No X (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ______	Is the Sampled Area within a Wetland?	Yes ______ No X
Hydric Soil Present? Yes X No ______		
Wetland Hydrology Present? Yes X No ______		

Remarks:

Overall study area has been disturbed over time. This data point is adjacent to a parking lot and no upland data point was collected. Also, NOAA has this portion of Berkeley County identified as having moderate to severe drought status.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [x] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ______	Depth (inches): tidal	
Water Table Present? Yes X No ______	Depth (inches): 4	
Saturation Present? (includes capillary fringe) Yes X No ______	Depth (inches): 0	**Wetland Hydrology Present? Yes X No ______**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 6 days after rainfall event.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-4

Tree Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			

50% of total cover: ____ 20% of total cover: ____

Sapling/Shrub Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Baccharis hamifolia	10	yes	fac
2. Salix nigra	5	yes	obl
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	15		

50% of total cover: 7.5 20% of total cover: 3

Herb Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Spartina alternaflora	60	yes	obl
2. Juncus roemarianus	10		obl
3. Typha angustifolia	10		obl
4. Juncus effusis	5		facw
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
= Total Cover	85		

50% of total cover: 42.5 20% of total cover: 17

Woody Vine Stratum (Plot size: ____)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Campsis radicans	3	yes	fac
2. Smilax glauca	2		fac
3.			
4.			
5.			
= Total Cover	5		

50% of total cover: 2.5 20% of total cover: 1

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

tidal marsh

SOIL

Sampling Point: DP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y 5/1	100					silty clay loam	
5-14	2.5Y 6/1	100					loamy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: NPTU Joint Base Charleston City/County: N. Charleston/Berkley Sampling Date: 08-20-11

Applicant/Owner: Air Force State: SC Sampling Point: DP-5

Investigator(s): John Lowenthal Section, Township, Range: ______

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR or MLRA): LRRT Lat: 32-56-36.22N Long: 79-55-53.42 Datum: ______

Soil Map Unit Name: Bohickett association NWI classification: wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____		**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present? Yes X No ____		
Wetland Hydrology Present? Yes X No ____		

Remarks:

Overall study area has been disturbed over time. Also, NOAA has this portion of Berkeley County identified as having moderate to severe drought status.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): 4-6 in stream

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): 5-6

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 1 day after rainfall event.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-5

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	30	yes	fac
2. Liquidambar styraciflua	20		fac
3.			
4.			
5.			
6.			
7.			
8.			
	50 = Total Cover		
50% of total cover: 25	20% of total cover: 10		

Sapling/Shrub Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Myrican cerifera	20	yes	fac
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Sagittaria latifolia	10	yes	obl
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Smilax rotundifolia	5	yes	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 4/1	100					clay loam	
4-10	2.5Y 5/1	90	7.5YR 4/6	10	C	M	clay loam	
10-14	2.5Y 6/1	95	7.5 YR 5/6	5	C	M	loamy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: NPTU Joint Base Charleston City/County: N. Charleston/Berkley Sampling Date: 08-20-11

Applicant/Owner: Air Force State: SC Sampling Point: DP-6

Investigator(s): John Lowenthal Section, Township, Range: ______

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR or MLRA): LRRT Lat: 32-56-36.22N Long: 79-55-53.42 Datum: ______

Soil Map Unit Name: Bohickett association NWI classification: wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ___	**Is the Sampled Area within a Wetland?** **Yes** ___ **No** ___
Hydric Soil Present?	Yes ___ No ___	
Wetland Hydrology Present?	Yes ___ No ___	

Remarks:

Overall study area has been disturbed over time. Also, NOAA has this portion of Berkeley County identified as having moderate to severe drought status.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 1 day after rainfall event.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-6

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juniperus virginiana	20	yes	facu
2. Pinus taeda	35	yes	fac
3. Liquidambar styraciflua	20	yes	fac
4.			
5.			
6.			
7.			
8.			
	75	= Total Cover	
50% of total cover: 37.5	20% of total cover: 15		

Sapling/Shrub Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ligustrum sinense	25	yes	fac
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	25	= Total Cover	
50% of total cover: 12.5	20% of total cover: 5		

Herb Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Lonicera japonica	5	yes	fac
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5	= Total Cover	
50% of total cover: 2.5	20% of total cover: 1		

Woody Vine Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Smilax rotundifolia	5	yes	FAC
2. Toxicodendron radicans	2		FAC
3. parthenocissus quincefolia	7	yes	FAC
4.			
5.			
	14	= Total Cover	
50% of total cover: 7	20% of total cover: 2.8		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 86 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 4/4	100					loam	
6-12	2.5Y 6/4	100					loam	
12-16	2.5Y 6/2	90	7.5YR 5/6	10	C	M	loamy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ____ No X

Remarks:

It appears that the surface profile is fill material and the hydric layer appears compressed.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: NPTU Joint Base Charleston City/County: N. Charleston/Berkley Sampling Date: 08-20-11

Applicant/Owner: Air Force State: SC Sampling Point: DP-7

Investigator(s): John Lowenthal Section, Township, Range: ______

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR or MLRA): LRRT Lat: 32-56-36.22N Long: 79-55-53.42 Datum: ______

Soil Map Unit Name: Capers Association NWI classification: upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No X (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______	**Is the Sampled Area within a Wetland?** Yes ______ No X
Hydric Soil Present?	Yes ______	No X	
Wetland Hydrology Present?	Yes ______	No X	

Remarks:

Overall study area has been disturbed over time. Also, NOAA has this portion of Berkeley County identified as having moderate to severe drought status.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ______	No X	Depth (inches): ______
Water Table Present?	Yes ______	No X	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes ______	No X	Depth (inches): ______

Wetland Hydrology Present? Yes ______ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 2 days after rainfall event.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-7

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	35	yes	fac
2. Juniperus virginiana	10		facu
3. Acer rubrum	30	yes	fac
4.			
5.			
6.			
7.			
8.			
	75	= Total Cover	
50% of total cover: 37.5	20% of total cover: 15		

Sapling/Shrub Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ligustrum sinense	25	yes	fac
2. Ilex opaca	10	yes	fac
3.			
4.			
5.			
6.			
7.			
8.			
	35	= Total Cover	
50% of total cover: 17.5	20% of total cover: 7		

Herb Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. pinus taeda	3	yes	fac
2. lonicera japinica	2		fac
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5	= Total Cover	
50% of total cover: 2.5	20% of total cover: 1		

Woody Vine Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Smilax rotundifilia	5	yes	fac
2.			
3.			
4.			
5.			
	5	= Total Cover	
50% of total cover: 2..5	20% of total cover: 1		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- [ ] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [ ] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	5Y 5/4	100					sandy loam	
5-14	2.5Y 5/4	100					sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: NPTU Joint Base Charleston City/County: N. Charleston/Berkley Sampling Date: 08-21-11

Applicant/Owner: Air Force State: SC Sampling Point: DP-8

Investigator(s): John Lowenthal Section, Township, Range: ______

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR or MLRA): LRRT Lat: 32-56-36.22N Long: 79-55-53.42 Datum: ______

Soil Map Unit Name: Capers Asociation NWI classification: wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

Overall study area has been disturbed over time. Also, NOAA has this portion of Berkeley County identified as having moderate to severe drought status.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 8

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 3 days after rainfall event.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-8

Tree Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	25	yes	fac
2. Acer rubrum	25	yes	fac
3. Liquidambar styraciflua	25	yes	fac
4.			
5.			
6.			
7.			
8.			
	75 = Total Cover		

50% of total cover: 37.5 20% of total cover: 15

Sapling/Shrub Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Ligustrum sinense	25	yes	fac
2. myrica cerifera	10	yes	fac
3.			
4.			
5.			
6.			
7.			
8.			
	35 = Total Cover		

50% of total cover: 17..5 20% of total cover: 7

Herb Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Osmundia cinnamomea	5	yes	facw
2. Juncus effusis	5	yes	facw
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10 = Total Cover		

50% of total cover: 5 20% of total cover: 2

Woody Vine Stratum (Plot size: 30)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: ____ 20% of total cover: ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 4/2	100					sandy loam	
3-10	2.5Y 5/2	95	10YR 5/4	5	C	M	loam	
10-14	2.5Y 5/1	95	10YR 4/4	5	C	M	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ______

Remarks:

APPENDIX D REID SURVEY

RED BANK RD.

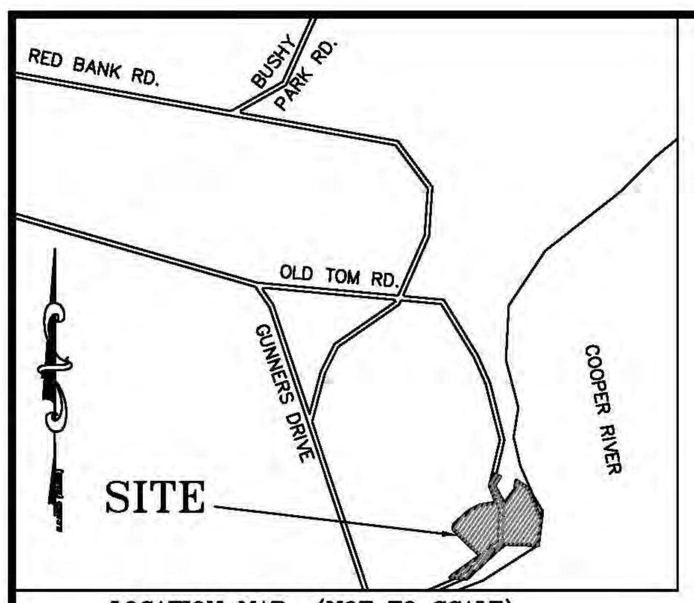
BUSHY PARK RD.

OLD TOM RD.

GUNNERS DRIVE

COOPER RIVER

SITE



LOCATION MAP (NOT TO SCALE)

NOTES:

1.) DATUM = NAD 83

2.) ANYTHING SHOWN OUTSIDE THE SURVEYED WETLAND LINES IS FOR DESCRIPTIVE PURPOSES ONLY. OTHER PROPERTY DETAILS TAKEN FROM AERIAL PHOTOGRAPHS OR WERE FURNISHED BY TEC, INC.

3.) AREA INFORMATION TAKEN FROM ACTUAL WETLAND SURVEY LINES AND COMPILED INFORMATION PROVIDED BY TEC, INC. ALL AREAS ARE APPROXIMATE.

4.) THIS DOCUMENT DOES NOT REPRESENT A LAND SURVEY AND IS UNSUITABLE FOR DEEDING OF PROPERTY OR RECORDATION.

LEGEND

PROJECT LIMITS

WETLAND FLAG

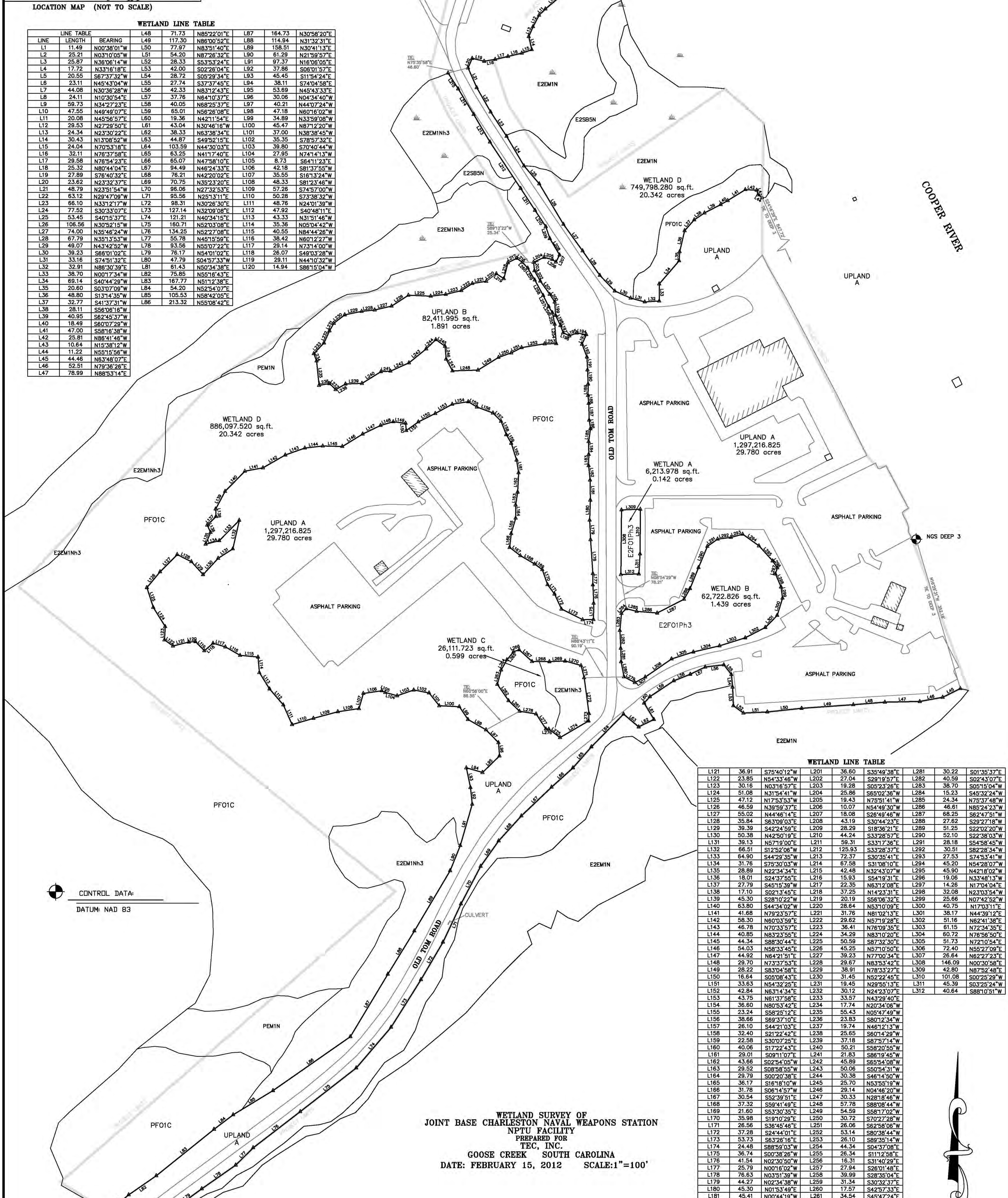
MARSH

NATIONAL GEODETIC SURVEY MARKER

AREA TABLE	
WETLAND A	0.142 ACRES
WETLAND B	1.439 ACRES
WETLAND C	0.599 ACRES
WETLAND D	20.342 ACRES
UPLAND A	29.780 ACRES
UPLAND B	1.891 ACRES
TOTAL	54.193 ACRES

WETLAND LINE TABLE

LINE TABLE			L48	71.73	N85°22'01"E	L87	164.73	N30°58'20"E
LINE	LENGTH	BEARING	L49	117.30	N86°00'52"E	L88	114.94	N31°32'31"E
L1	11.49	N00°38'01"W	L50	77.97	N83°51'40"E	L89	158.51	N30°41'13"E
L2	25.21	N03°10'05"W	L51	54.20	N87°26'32"E	L90	61.29	N21°59'57"E
L3	25.87	N36°06'14"W	L52	28.33	S53°53'24"E	L91	97.37	N16°06'05"E
L4	17.72	N33°16'18"E	L53	42.00	S02°26'04"E	L92	37.86	S06°01'57"E
L5	20.55	S67°37'32"W	L54	28.72	S05°29'34"E	L93	45.45	S11°54'24"E
L6	23.11	N45°43'04"W	L55	27.74	S37°37'45"E	L94	38.11	S74°04'58"E
L7	44.08	N30°36'28"W	L56	42.33	N83°12'43"E	L95	53.69	N45°43'33"E
L8	24.11	N10°30'54"E	L57	37.76	N64°10'37"E	L96	30.06	N04°34'40"W
L9	59.73	N34°27'23"E	L58	40.05	N68°25'37"E	L97	40.21	N44°07'24"W
L10	47.55	N49°49'07"E	L59	65.01	N56°26'08"E	L98	47.18	N60°16'02"W
L11	20.08	N45°56'57"E	L60	19.36	N42°11'54"E	L99	34.89	N33°59'08"W
L12	29.53	N27°29'50"E	L61	43.04	N30°46'16"W	L100	45.47	N87°12'20"W
L13	24.34	N23°30'22"E	L62	38.33	N63°38'34"E	L101	37.00	N38°38'45"W
L14	30.43	N13°08'52"W	L63	44.87	S49°52'15"E	L102	35.35	S78°57'32"E
L15	24.04	N70°53'18"E	L64	103.59	N44°30'03"E	L103	39.80	S70°40'44"W
L16	32.11	N76°37'58"E	L65	63.25	N41°17'40"E	L104	27.95	N74°14'13"W
L17	29.58	N76°54'23"E	L66	65.07	N47°58'10"E	L105	8.73	S64°11'23"E
L18	25.32	N80°44'04"E	L67	94.49	N46°24'33"E	L106	42.18	S81°37'55"W
L19	27.89	S76°40'32"E	L68	76.21	N42°20'02"E	L107	35.55	S16°13'24"W
L20	23.62	N23°32'37"E	L69	70.75	N35°23'20"E	L108	48.33	S81°23'46"W
L21	48.79	N23°51'54"W	L70	96.06	N27°32'53"E	L109	57.26	S74°57'00"W
L22	63.12	N29°47'09"W	L71	95.56	N25°13'11"E	L110	50.28	S73°38'32"W
L23	66.10	N33°12'17"W	L72	98.31	N30°26'30"E	L111	48.76	N24°01'39"W
L24	77.52	S30°33'07"E	L73	127.14	N32°09'08"E	L112	47.92	S40°48'11"E
L25	53.45	S40°15'37"E	L74	121.21	N40°34'15"E	L113	43.33	N31°51'46"W
L26	106.56	N30°52'15"W	L75	160.71	N52°03'08"E	L114	35.36	N05°04'42"W
L27	74.00	N35°46'24"W	L76	134.25	N52°27'08"E	L115	40.55	N84°44'26"W
L28	67.79	N35°13'53"W	L77	55.78	N45°15'59"E	L116	38.42	N60°12'27"W
L29	49.07	N43°42'52"W	L78	93.56	N55°07'22"E	L117	29.14	N73°14'00"W
L30	39.23	S66°01'02"E	L79	76.17	N54°01'02"E	L118	26.07	S49°03'28"W
L31	33.16	S74°51'32"E	L80	47.79	S04°57'33"W	L119	29.11	N44°10'32"W
L32	32.91	N86°30'39"E	L81	61.43	N50°34'38"E	L120	14.94	S86°15'04"W
L33	38.70	N00°17'34"W	L82	75.85	N55°16'43"E			
L34	69.14	S40°44'29"W	L83	167.77	N51°12'38"E			
L35	20.60	S03°07'09"W	L84	54.20	N52°54'07"E			
L36	48.80	S13°14'35"W	L85	105.53	N58°42'05"E			
L37	32.77	S41°37'31"W	L86	213.32	N55°08'42"E			
L38	28.11	S56°06'16"W						
L39	40.95	S62°45'37"W						
L40	18.49	S60°07'29"W						
L41	47.00	S58°16'38"W						
L42	25.81	N86°41'46"W						
L43	10.64	N15°38'12"W						
L44	11.22	N55°15'56"W						
L45	44.46	N63°48'07"E						
L46	52.51	N79°36'26"E						
L47	78.99	N88°53'14"E						



CONTROL DATA:

DATUM: NAD 83

WETLAND LINE TABLE

L121	36.91	S75°40'12"W	L201	36.60	S35°49'38"E	L281	30.22	S01°35'37"E
L122	23.85	N54°33'46"W	L202	27.04	S29°19'57"E	L282	40.59	S02°43'07"E
L123	30.16	N03°16'57"E	L203	19.28	S05°23'26"E	L283	38.70	S05°15'04"W
L124	51.08	N31°54'41"W	L204	25.86	S65°02'36"W	L284	15.23	S45°32'24"W
L125	47.12	N17°53'53"W	L205	19.43	N75°51'41"W	L285	24.34	N75°37'48"W
L126	46.59	N39°59'37"E	L206	10.07	N54°49'30"W	L286	46.61	N85°24'23"W
L127	55.02	N44°46'14"E	L207	18.08	S26°49'46"W	L287	68.25	S62°47'51"W
L128	35.84	S63°09'03"E	L208	43.19	S30°44'23"E	L288	27.62	S29°27'18"W
L129	39.39	S42°24'59"E	L209	28.29	S18°36'21"E	L289	51.25	S22°02'20"W
L130	50.38	N42°50'19"E	L210	44.24	S33°28'57"E	L290	52.10	S22°38'03"W
L131	39.13	N57°19'00"E	L211	59.31	S33°17'36"E	L291	28.18	S54°58'45"W
L132	66.51	S12°52'06"W	L212	125.93	S33°28'37"E	L292	30.51	S82°28'34"W
L133	64.90	S44°29'35"W	L213	72.37	S30°35'41"E	L293	27.53	S74°53'41"W
L134	31.76	S75°30'03"W	L214	67.58	S31°08'10"E	L294	45.20	N54°28'07"W
L135	28.89	N22°34'34"E	L215	42.48	N32°43'07"W	L295	45.90	N42°18'02"W
L136	18.01	S24°37'55"E	L216	15.93	S54°19'31"E	L296	19.06	N33°48'13"W
L137	27.79	S45°15'39"W	L217	22.35	N63°12'08"E	L297	14.26	N17°04'04"E
L138	17.10	S02°13'45"E	L218	37.25	N14°23'31"E	L298	32.08	N23°03'54"W
L139	45.30	S28°10'22"W	L219	20.19	S56°06'32"E	L299	25.66	N07°42'52"W
L140	63.80	S44°34'02"W	L220	28.64	N53°10'09"E	L300	40.75	N17°03'11"E
L141	41.68	N79°23'57"E	L221	31.76	N81°02'13"E	L301	38.17	N44°39'12"E
L142	58.30	N60°03'59"E	L222	29.62	N57°19'28"E	L302	51.16	N62°41'38"E
L143	46.78	N70°33'57"E	L223	36.41	N76°09'35"E	L303	61.15	N72°34'35"E
L144	40.85	N83°23'55"E	L224	34.29	N83°10'20"E	L304	60.72	N76°56'50"E
L145	44.34	S88°30'44"E	L225	50.59	S87°32'30"E	L305	51.73	N72°10'54"E
L146	54.03	N58°33'45"E	L226	45.25	N57°10'50"E	L306	72.40	N55°27'09"E
L147	44.92	N64°21'51"E	L227	39.23	N77°00'34"E	L307	26.64	N62°27'23"E
L148	29.70	N73°37'53"E	L228	29.67	N83°53'42"E	L308	146.09	N00°30'58"E
L149	28.22	S83°04'58"E	L229	38.91	N78°33'27"E	L309	42.80	N87°52'48"E
L150	16.64	S05°08'43"E	L230	31.45	N52°22'45"E	L310	101.08	S00°25'29"W
L151	33.63	N54°32'25"E	L231	19.45	N29°55'13"E	L311	45.39	S03°25'24"W
L152	42.84	N63°14'34"E	L232	30.12	N24°23'07"E	L312	40.64	S88°10'51"W
L153	43.75	N61°37'58"E	L233	33.57	N43°29'40"E			
L154	36.60	N80°53'42"E	L234	17.74	N20°34'06"W			
L155	23.24	S58°25'12"E	L235	55.43	N05°47'49"W			
L156	38.66	S69°37'10"E	L236	23.83	S80°12'34"W			
L157	26.10	S44°21'03"E	L237	19.74	N46°12'13"W			
L158	32.40	S21°22'42"E	L238	25.65	S60°14'29"W			
L159	22.58	S30°07'25"E	L239	37.18	S87°57'14"W			
L160	40.06	S17°22'43"E	L240	50.21	S58°20'55"W			
L161	29.01	S09°11'07"E	L241	21.83	S86°19'45"W			
L162	43.66	S02°54'05"W	L242	45.89	S65°54'08"W			
L163	29.52	S08°58'55"W	L243	50.06	S50°54'31"W			
L164	29.79	S00°20'38"E	L244	30.38	S46°14'50"W			
L165	36.17	S16°18'10"W	L245	25.70	N53°55'19"W			
L166	31.78	S06°14'57"W	L246	29.14	N04°46'20"W			
L167	30.54	S52°39'51"E	L247	30.33	N28°18'46"W			
L168	37.32	S59°41'49"E	L248	57.78	S88°08'44"W			
L169	21.60	S53°30'35"E	L249	54.59	S58°17'02"W			
L170	35.98	S19°10'29"E	L250	30.72	S70°27'28"W			
L171	26.56	S36°45'46"E	L251	26.06	S62°58'06"W			
L172	37.28	S24°44'01"E	L252	53.14	S80°38'44"W			
L173	53.73	S63°26'16"E	L253	26.10	S89°35'14"W			
L174	24.48	S88°59'03"W	L254	44.34	S04°37'08"E			
L175	36.74	S00°38'26"W	L255	26.34	S11°12'58"E			
L176	41.54	N02°30'50"W	L256	16.31	S31°40'29"E			
L177	25.79	N00°16'02"W	L257	27.94	S26°01'48"E			
L178	76.63	N03°51'39"W	L258	39.99	S28°35'04"E			
L179	44.27	N02°34'38"W	L259	31.34	S30°32'37"E			
L180	45.30	N01°53'49"E	L260	17.57	S42°57'33"E			
L181	45.41	N00°44'19"W	L261	34.54	S45°47'24"E			
L182	32.73	N05°40'51"W	L262	44.66	S34°40'36"E			
L183	25.54	N00°30'48"E	L263	33.65	S14°38'33"W			
L184	29.07	N00°34'00"W	L264	26.56	S29°52'51"W			
L185	29.37	N08°18'37"E	L265	23.75	S39°12'24"W			
L186	19.56	N08°50'53"W	L266	13.22	S71°19'54"W			
L187	37.77	N01°37'35"W	L267	39.41	N47°59'55"W			
L188	18.28	N04°49'38"W	L268	39.46	N89°18'33"W			
L189	25.76	N00°35'21"E	L269	35.50	S87°29'37"W			
L190	31.96	N02°25'57"W	L270	37.46	N74°01'31"W			
L191	29.07	N02°35'57"W	L271	28.49	N14°13'36"W			
L192	31.01	N21°00'04"W	L272	81.77	S07°37'02"E			
L193	23.71	N23°52'56"E	L273	16.57	S02°40'34"W			
L194	21.90	N80°23'10"W	L274	74.81	S59°45'43"W			
L195	17.89	S69°07'16"W	L275	31.67	N52°57'33"W			
L196	15.43	N63°55'23"W	L276	6.76	N88°09'46"W			
L197	17.67	N20°41'08"W	L277	40.65	N33°00'30"W			
L198	25.83	S25°41'48"E	L278	38.06	S80°49'23"E			
L199	29.96	S03°23'23"E	L279	27.62	S62°18'48"E			
L200	20.86	S32°44'37"E	L280	34.85	S10°52'13"E			

WETLAND SURVEY OF JOINT BASE CHARLESTON NAVAL WEAPONS STATION NPTU FACILITY

PREPARED FOR

TEC, INC.

GOOSE CREEK SOUTH CAROLINA

DATE: FEBRUARY 15, 2012 SCALE:1"=100'

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

I, HEREBY STATE THAT TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM STANDARDS MANUAL FOR THE PRACTICE OF LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS OF A CLASS _A_ SURVEY AS SPECIFIED THEREIN; ALSO THERE ARE NO VISIBLE ENCROACHMENTS, PROJECTIONS, OR SETBACKS AFFECTING THE PROPERTY OTHER THAN THOSE SHOWN.

SOUTH CAROLINA PROFESSIONAL LAND SURVEYOR REG. No. 17228 JAMES T. REID

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION REID SURVEYING, LLC No. 3905

JAMES T. REID P.L.S. S.C. No.17228

REID SURVEYING, LLC
PO BOX 20182 CHARLESTON, SC 29413
(843) 367-1412 FAX (843) 300-1107
www.reidsurveying.com tom@reidsurveying.com

APPENDIX E CORPS CONFIRMATION LETTER

DEPARTMENT OF THE ARMY
CHARLESTON DISTRICT, CORPS OF ENGINEERS
69A HAGOOD AVENUE
CHARLESTON, SOUTH CAROLINA 29403-5107

REPLY TO
ATTENTION OF

April 2, 2012

Regulatory Division

Mr. Terrence Larimer
Joint Base Charleston, Building 36
2316 Red Bank Road
Goose Creek, South Carolina 29445

Re: SAC 2011-00715
Berkeley County

Dear Mr. Larimer:

This is in response to your letter of November 14, 2011, requesting a wetland determination, on behalf of the United States Air Force, for a 54.193 acre tract located adjacent to the existing Naval Nuclear Power Training Unit at Joint Base Charleston in Berkeley County, South Carolina. The project area is depicted on the survey plat you submitted which was prepared by Reid Surveying, LLC, dated February 15, 2012, and entitled "Wetland Survey of Joint Base Charleston Naval Weapons Station NPTU Facility".

This plat depicts surveyed boundaries of wetlands or other waters of the United States as established by your office. You have requested that this office verify the accuracy of this mapping as a true representation of wetlands or other waters of the United States within the regulatory authority of this office. The property in question contains 22.522 acres of federally defined jurisdictional freshwater wetlands or other waters of the United States subject to the jurisdiction of this office. The location and configuration of these areas are reflected on the plat referenced above.

Based on an on-site inspection and a review of aerial photography and soil survey information, it has been determined that the surveyed jurisdictional boundaries shown on the referenced plat are an accurate representation of jurisdictional areas within our regulatory authority. This office should be contacted prior to performing any work in these areas. Enclosed is a form describing the basis of jurisdiction for the areas in question. You should also be aware that these areas may be subject to restrictions or requirements of other state or local governmental entities.

If a permit application is forthcoming as a result of this delineation, a copy of this letter, as well as the verified survey plat, should be submitted as part of the application. Otherwise, a delay could occur in confirming that a delineation was performed for the permit project area.

Please be advised that this determination is valid for five (5) years from the date of this letter unless new information warrants revision of the delineation before the expiration date. All actions concerning this determination must be complete within this time frame, or an additional delineation must be conducted. This **approved** jurisdictional determination is an appealable action under the Corps of Engineers administrative appeal procedures defined at 33 CFR 331. The administrative appeal options, process and appeals request form is attached for your convenience and use.

In future correspondence concerning this matter, please refer to SAC 2011-00715. You may still need state or local assent. Prior to performing any work, you should contact the South Carolina Department of Health and Environmental Control, Office of Ocean Coastal Resource Management. A copy of this letter is being forwarded to them for their information.

If you have any questions concerning this matter, please contact me at 843-329-8044 or toll free (outside of the Charleston area) at 1-866-329-8187.

Sincerely,

Nathaniel I. Ball
Biologist

Enclosures:
Basis for Jurisdiction
Notification of Appeal Options

Copy Furnished:

Mr. Steve Brooks
South Carolina Department of Health
and Environmental Control
Office of Ocean and Coastal
Resource Management
1362 McMillan Avenue, Suite 400
Charleston, South Carolina 29405

Mr. John S. Ward
Nuclear Power Training Unit
1260 Snow Pointe Road
Goose Creek, South Carolina 29445-8612

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): March 14, 2012

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: SAC 2011-00715

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State:South Carolina County/parish/borough: Jasper County City: Joint Base Charleston
Center coordinates of site (lat/long in degree decimal format): Lat. 32.94396° N, Long. -79.93173° W.
Universal Transverse Mercator:
Name of nearest waterbody: Cooper River

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Cooper River
Name of watershed or Hydrologic Unit Code (HUC): Cooper River 03050201
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s): January 18, 2012

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are** *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☒ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** *"waters of the U.S."* within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. Waters of the U.S.

a. Indicate presence of waters of U.S. in review area (check all that apply): [1]

☒ TNWs, including territorial seas
☒ Wetlands adjacent to TNWs
☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
☐ Non-RPWs that flow directly or indirectly into TNWs
☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
☐ Impoundments of jurisdictional waters
☐ Isolated (interstate or intrastate) waters, including isolated wetlands

b. Identify (estimate) size of waters of the U.S. in the review area:
Non-wetland waters: linear feet: width (ft) and/or acres.
Wetlands: 22.522 acres.

c. Limits (boundaries) of jurisdiction based on: **1987 Delineation Manual**
Elevation of established OHWM (if known):

2. Non-regulated waters/wetlands (check if applicable):[3]

☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain:

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: **Cooper River.**

Summarize rationale supporting determination: The portion of the Cooper River where the project site is located is subject to the ebb and flow of the tide and is considered a navigable water.

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": The term adjacent referes to a system that is bordering, contiguous, or neighboring. The wetlands on the project site include areas that are separated from the existing tidal waters by roadways (man made features) and areas that are connected to tidal waters by water control structures and/or culverts. The existing wetlands also include areas that were not completely filled when the site was developed.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **Pick List**
Drainage area: **Pick List**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

---

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West

Identify flow route to TNW[5]: .
Tributary stream order, if known: .

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):
☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List.** Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):
☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .

---

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

Identify specific pollutants, if known:

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- ☐ Riparian corridor. Characteristics (type, average width):
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List.** Explain findings:

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☒ TNWs: linear feet width (ft), Or, 3.129 acres.
   ☒ Wetlands adjacent to TNWs: 17.213 acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination:

---

[8] See Footnote # 3

[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook

[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Provide estimates for jurisdictional waters in the review area (check all that apply):
- ☐ Tributary waters: linear feet width (ft).
- ☐ Other non-wetland waters: acres.
  Identify type(s) of waters: .
- ☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
- ☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- ☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- ☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- ☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
- ☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
- ☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☒ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps: .
- ☐ Corps navigable waters' study: .
- ☐ U.S. Geological Survey Hydrologic Atlas: .
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☒ U.S. Geological Survey map(s). Cite scale & quad name: North Charleston Quadrangle.
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Berkeley County, Web Soil Survey.
- ☐ National wetlands inventory map(s). Cite name: .
- ☐ State/Local wetland inventory map(s): .
- ☐ FEMA/FIRM maps: .
- ☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☐ Photographs: ☐ Aerial (Name & Date): .
  or ☐ Other (Name & Date): .
- ☐ Previous determination(s). File no. and date of response letter: .
- ☐ Applicable/supporting case law: .
- ☐ Applicable/supporting scientific literature: .
- ☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: Naval Weapons Station Charleston (NWSC) obtained a jurisdictional determination (SAC-2007-02193) for a 28.40-acre site in 2008. Since that time NWSC has been renamed Joint Base Charleston and the original project site has been expanded to include 54.19 acres of uplands and wetlands. Based on our site inspection, the wetlands on the

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant:		File Number:	Date:
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
X	**APPROVED JURISDICTIONAL DETERMINATION**		**D**
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the Division Engineer, South Atlantic Division, 60 Forsyth St. SW, Atlanta, GA 30308-8801. This form must be received by the Division Engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD **is not appealable**. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact the Corps biologist who signed the letter to which this notification is attached. The name and telephone number of this person is given at the end of the letter.	If you only have questions regarding the appeal process you may also contact the Coordinator for Appeals in our South Atlantic Division Office in Atlanta, Georgia at (404) 562-5136. 60 Forsyth St, SW Atlanta, GA 30308-8801

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

___________________________ Signature of appellant or agent.	Date:	Telephone number:

APPENDIX F

ESSENTIAL FISH HABITAT ASSESSMENT

APPENDIX F ESSENTIAL FISH HABITAT ASSESSMENT

F1.0 INTRODUCTION AND PROPOSED ACTION

The United States Navy (Navy) has prepared an environmental assessment (EA) to assess potential impacts from proposed infrastructure improvements needed to accommodate current, as well as the anticipated increase of student numbers at the Nuclear Power Training Unit Charleston (NPTU Charleston), North Charleston, South Carolina. NPTU Charleston is located in Berkeley County, along the Cooper River at Joint Base Charleston (Figure F1).

The Proposed Action would alleviate current overcrowding, accommodate an increase in the number of students trained (with associated increase in NPTU Charleston staff), provide facilities for transitioning to newer Moored Training Ships (MTSs), allow for uninterrupted student training during MTS transition, and ensure all facilities meet Department of Defense, Navy, and U.S. Air Force security requirements. To accomplish this, the preferred alternative would demolish, renovate, and upgrade existing facilities and infrastructure; construct academic and training facilities; relocate MTS support systems; increase the number of parking spaces; expand pier facilities to support uninterrupted MTS operation and training during the transition to the newer MTSs; and implement improved security and access measures (Figure F2).

The purpose of this EFH Assessment is to determine whether the Navy's proposed NPTU Charleston Facilities Expansion Project would affect EFH managed under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Based upon the analysis presented below, the Navy has determined that the NPTU Charleston Facilities Expansion Project may adversely affect EFH with minor impacts, some of which will be transient, and many of which will be mitigated through the addition of hard surfaces, reduced shading, timing of in-water work, and use of best management practices during construction.

F2.0 PROJECT DESCRIPTION

F2.1 Introduction

NPTU Charleston is located in Berkeley County, South Carolina, on Joint Base Charleston (Figure 1). Its mission is to provide highly qualified nuclear operators and supervisors for the Naval nuclear-powered Fleet which comprise 45% of the Navy's major combatants. NPTU Charleston trains about half of the Navy's personnel who operate Navy nuclear reactor plants. Existing training facilities must be upgraded and the number of students trained at this facility is expected to approximately double over the next 10 years. Current training occurs along the shore of the Cooper River and infrastructure includes piers, two MTSs, and other support facilities. The two MTSs at NPTU Charleston contain the nuclear reactor plants needed for student training.

Figure F1 Vicinity Map

Figure 2 Preferred Alternative Construction Footprint

F2.2 Proposed Action (Preferred Alternative)

The proposed action, including a description of additional action alternatives and the No-Action Alternative, are fully described in detail in the February 2012 Draft Environmental Assessment entitled: *Naval Nuclear Power Training Unit-Charleston (NPTU Charleston), Joint Base Charleston NPTU Charleston Facilities Expansion Draft Environmental Assessment.*

One set of alternatives, including the Preferred Alternative, would result in the installation of an extension measuring 300 feet (ft) long by 60 ft wide using up to 180 pilings onto Pier X-Ray North (Figure 2). Pilings would be up to 24 inches in diameter; the piling type and the pile driving method have not yet been determined. It is expected that pile driving would take 10 months. Through on-going consultation with the NMFS Protected Resources Division for shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), the Navy proposes to limit in-water work to April 1 through September 30 to avoid potential impacts to migrating sturgeons that may be in the area from October through March.

The existing Port Security Barrier (PSB) would be extended to accommodate the proposed pier extension (Figure 2). The existing PSB consists of a floating segment affixed to the bottom with concrete anchors approximately 12 ft by 6 ft by 6 ft in size. Anchors may be set directly on the bottom or minor dredging may be required at each anchor site to install the anchors to keep their profile low to protect deep-draft vessels.

To meet Anti-Terrorism Force Protection (ATFP) minimum requirements, the on-shore chain-link security fence would be extended through estuarine intertidal wetlands (Figure 2), impacting approximately 0.5 acre of estuarine wetlands under all sets of alternatives. The 0.5 acre estimated impact would be minimal, stemming from the installation of fence posts with the chain-link suspended above the wetland.

Parking would be expanded by resurfacing about 550 existing parking spaces and constructing up to 1,350 new spaces (Figure 2). Two new entrances would be added to access parking areas from Old Tom Road and pedestrian walkways around the parking areas would be constructed. Estuarine intertidal wetlands would not be directly impacted by the action to increase parking under any alternative, but up to 6.5 acres of palustrine wetlands would be impacted under the set of alternatives that includes the preferred alternative.

F3.0 EFH BACKGROUND

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires that the regional Fishery Management Councils (FMCs), through federal fishery management plans (FMPs), describe and identify EFH for each federally managed species; minimize, to the extent practicable, adverse effects on such habitat caused by fishing; and identify other actions to encourage the conservation and enhancement of such habitats. Pursuant to the MSA, the South Atlantic FMC (SAFMC) has identified EFH for federally managed species within the waters of North Carolina, South Carolina, Georgia, and Florida.

Congress defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The term "fish" is defined in the MSA as "finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds" (16 United States Code [USC] 1802[10]). The regulations for implementing EFH clarify that "waters" include all aquatic areas and their biological, chemical, and physical properties, while "substrate" includes the associated biological communities that make these areas suitable fish habitats (50 CFR 600.10). Habitats used at any time during a species' life cycle (i.e., during at least one of its life stages) must be accounted for when describing and identifying EFH (National Marine Fisheries Service [NMFS] 2002).

Habitat Areas of Particular Concern (HAPCs) are identified by the regional FMCs as discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation (50 CFR 600.805-600.815). Regional FMCs may designate a specific habitat area as an HAPC based on one or more of the following reasons: (1) importance of the ecological function provided by the habitat; (2) the extent to which the habitat is sensitive to human-induced environmental degradation; (3) whether, and to what extent, development activities are, or will be, stressing the habitat type; and (4) rarity of the habitat type (NMFS 2002). Categorization as an HAPC does not confer additional protection or restriction to the designated area.

F4.0 DESIGNATED EFH WITHIN THE VICINITY OF THE PROJECT AREA

Essential fish habitat exists in the project area for species in the Snapper-Grouper Complex and Penaeid Shrimp, and includes estuarine emergent habitat, the estuarine water column, and unconsolidated soft bottom.

Estuarine emergent habitat (saltmarsh, brackish marsh, and tidal creeks) is found in the project area and is one of the most biologically productive ecosystems in the world. The high primary productivity that occurs in the marsh and the transfer of detritus throughout the estuary from the marsh provides the base of the food chain supporting many marine organisms. Estuarine emergent habitat provides spawning habitat for some prey-fish species, such as killifish, shellfish, and invertebrates, and nursery habitat for Council-managed species and threatened and endangered species. Beyond the estuary, exported marsh nutrients, detritus, and prey species contribute to ecosystems that support managed species such as coastal migratory pelagic, such as mackerels (SAFMC 2009).

Estuarine water column habitat is in the project area and is defined as the water covering a submerged surface and its physical, chemical, and biological characteristics. The estuarine water column provides nursery habitat for most planktivorous larvae and many juvenile pelagic species. The value of open water habitat for these species depends on the abundance and timing of planktonic food sources and their coincidence with required environmental conditions needed for growth during this critical time period. Species spawned offshore utilize water column nursery habitat extending from inlets to the upper reaches of estuaries (SAFMC 2009). Differences in the chemical and physical properties of the water affect the biological components of the water column, including fish distribution. Water column properties that may affect fisheries resources include temperature, salinity, dissolved oxygen (DO), total suspended solids, nutrients (nitrogen, phosphorus), and chlorophyll a (SAFMC 1998). Other factors, such as depth, pH, water velocity and movement, and water clarity, also affect the distribution of aquatic organisms.

Soft bottom habitat is in the project area. Soft bottom is unconsolidated, unvegetated sediment that occurs in freshwater, estuarine, and marine systems; it is dependent upon continued sediment supply. Although soft bottom habitat is defined as unvegetated and lacks visible structural habitat, the surface sediments support an abundance of microscopic plants and numerous burrowing animals. Soft bottom is used to some extent by almost all coastal fish species and shrimp. Juvenile and adult fish species that forage on the rich abundance of microalgae, detritus, and small invertebrates are highly dependent on the condition of soft bottom (SAFMC 2009).

Areas that meet the criteria for HAPCs for species in the Snapper-Grouper Complex include all coastal inlets and all state-designated nursery habitats of particular importance to species in the Complex (SAFMC 1998). Areas that meet the criteria for HAPCs for Penaeid Shrimp include all coastal inlets, all state-designated nursery habitats of particular importance to shrimp, and state-identified overwintering areas. Estuarine tidal creeks and salt marshes that serve as nursery grounds are perhaps the most important habitats occupied by penaeid shrimp. The major factor controlling shrimp growth and production is the availability of nursery habitat. South Carolina lacks seagrass beds an important penaeid nursery habitat in other areas. In South Carolina, the nursery habitat of shrimp is the high marsh areas with mud bottoms. In addition, there is seasonal movement out of the marsh into deep holes and creek channels adjoining the marsh system during winter. Therefore, the area of particular concern for early growth and development encompasses the entire estuarine system from the lower salinity portions of the river systems through the inlet mouths (SAFMC 1998).

F5.0 ASSESSMENT AND MITIGATION

This EFH Assessment analyzes the potential effects of Navy activities to EFH in the context of the MSA. Pilings (up to 24 inches in diameter, and up to 180 pilings for the preferred alternative) driven into the substrate to extend Pier X-Ray North would permanently replace up to 565 ft^2 of the existing soft bottom substrate. Removal of the existing finger pier would result in the removal of associated pilings from the water column. Installation of up to 6 anchors (12-ft by 6-ft footprint) for the reconfigured PSB would result in the permanent loss of up to 432 ft^2 of soft bottom. Temporary and minimal impacts to unconsolidated soft bottom and estuarine water column would also occur from incidental suspension of sediment during pile driving and anchor placement.

Following completion of the project, facilities provided by four command and support barges currently moored at the piers would be moved on-shore. Therefore, although additional pier space would be added under the proposed action, the total area of shaded estuarine water column would decrease by 34,000 ft^2 under the preferred alternative, enhancing habitat quality for at least some juvenile fishes (Able *et al*. 1999).

Surface area added through the introduction of pilings and available for attachment of sessile invertebrates would be about 45,000 ft^2 (minus the surface area removed in association with removal of the finger pier); this is assuming 24-inch pilings and water depth consistent with the pre-existing dredge permit of 40 ft. Additional hard surface associated with the PSB anchors will add up to 288 ft^2 per anchor (up to 1,728 ft^2 total). Pilings and hard substrates supporting sessile invertebrates are well-recognized as forage areas and habitat for finfish such as sheepshead (*Archosargus probatocephalus*; South Carolina Department of Natural Resources [SCDNR] 2012) and crustacean species such as blue crab (*Callinectes sapidus*; Toft *et al*. 1995).

The on-land security fence would impact no more than 0.5 acre of estuarine emergent wetland. The fence would be chain-link, permitting unimpeded movement of shrimp, estuarine fishes (i.e., Engraulids, Atherinids, and Fundulids) and juvenile fishes and crabs under purview of the SAFMC through and beneath the fence during those times when it becomes inundated. Fish could also move around the end of the fence where it meets the PSB. Best management practices will be applied during construction of the security fence to avoid and minimize sedimentation into the wetlands and adjacent estuarine water column.

Construction of the parking areas and pedestrian walkways will also take place in accord with best management practices to avoid and minimize sedimentation into the adjacent estuarine emergent wetlands and water column. Furthermore, a vegetated buffer area and other stormwater management features will be maintained between the parking areas/walkways and the estuarine emergent wetlands to maintain water quality.

F6.0 CONCLUSION

Direct adverse effects of the proposed action on EFH would be limited to the surface area of substrate affected by the pilings for Pier X-Ray North, anchors for the reconfigured PSB on unconsolidated soft bottom, and posts for the chain-link security fence in estuarine emergent wetlands. Indirect effects to the estuarine water column and emergent wetlands could result from sedimentation during pile driving, anchor placement, security fence installation, and finger pier removal; these effects would be temporary and would dissipate rapidly after each activity is complete. Potential indirect effects from construction of the parking area and pedestrian walkways will be mitigated using best management practices to avoid adverse effects to adjacent EFH. Stormwater management at NPTU Charleston will mitigate water quality impacts that could potentially result from the new parking area. Additionally, the proposed action will reduce estuarine water column shading and add water column forage areas and habitat for fishes in the project area. The Navy has determined the proposed action may adversely affect EFH with minor impacts.

F7.0 LITERATURE CITED

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SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION FOR THE

JOINT BASE CHARLESTON NPTU CHARLESTON FACILITIES EXPANSION DRAFT ENVIRONMENTAL ASSESSMENT

Following is information supplemental to that provided on 25 April 2012 with regard to consultation for Atlantic sturgeon potentially in vicinity of the proposed pier construction by the U.S. Navy at Naval Nuclear Power Training Unit, Charleston (NPTU Charleston), as described in the *Joint Base Charleston NPTU Charleston Facilities Expansion Draft Environmental Assessment*. The supplemental information presented below discusses salinity in the Cooper River and sound levels expected to result from pile driving activities.

SUPPLEMENTAL SALINITY INFORMATION

The Cooper River is a tidally-influenced river and a major tributary to Charleston Harbor. Flow from the adjacent Santee River was diverted into the Cooper River from 1941 until 1985, and increased the flow rate of the Cooper River by more than 150 times (Kjerfve and Magill 1990; Levisen and Dolah 1997; Pearlstine et al. 1985), reducing salinity in the Cooper River. The U.S. Army Corps of Engineers re-diverted approximately 70% of the Cooper River flow back into the Santee River in 1985, establishing more saline conditions in the Cooper River (Bradley et al. 1990; Conrads and Smith 1996; Levisen and Dolah 1997).

Published salinity studies since the re-diversion indicate salinities at water quality stations off the Army Depot, which is adjacent to NPTU Charleston, range between 5 and 23 ‰. These studies also suggested the head of the salt wedge, where salinity ranges range between 0 and 10 ‰, was approximately 10 kilometers (km) upriver from NPTU Charleston (Bradley et al. 1990; Conrads and Smith 1996; Kjerfve and Magill 1990). This distance to the head of the salt wedge is an amendment to the Navy's previous assertion that the head of the salt wedge was 3 km upriver of NPTU Charleston, as was presented in Enclosure (3) of the 25 April 2012 consultation letter.

Juvenile Atlantic sturgeon reside in the estuary and saline portions of rivers, but prefer low salinities near the heads of salt wedges, where saltwater and freshwater interface (Dovel and Berggren 1983; Lazzari et al. 1986). This interface area serves as the summer nursery habitat for juvenile Atlantic sturgeon in the southeast (Smith et al., 1993; McCord, 1998). The catch per unit effort (CPUE) of juvenile Atlantic sturgeon in the Cape Fear River, North Carolina, was greatest between June to September at the head of the salt wedge where the salinity was <10 ‰ (Moser and Ross 1995). Moreover, their daily rate of movement during summer (0.7 km/day) was about half that during winter (1.3 km/day; Moser and Ross 1995) due to lower dissolved oxygen, suggesting an even greater tendency to remain near the head of the salt wedge during summer. As such, the preferred summer habitat of juvenile Atlantic sturgeon in the Cooper River may be inferred to be approximately 10 km upriver of NPTU Charleston.

SUPPLEMENTAL SOUND INFORMATION

The pier construction at NPTU will utilize solid, steel-reinforced, concrete pilings. Pile driving solid concrete pilings generates less sound than pile driving hollow concrete pilings or steel pilings – even steel pilings attenuated by foam lining or surrounded by a bubble curtain (Laughlin 2007). The maximum estimated distance to underwater noise thresholds for fish is 43 m for injury and 215 m for behavioral modification for the concrete pilings to be used for the proposed project (Table 1). The injury thresholds are confined close to the activity; none of the sounds associated with injury thresholds are projected to extend beyond the floating port security barrier. The behavior threshold extends to the middle of the Cooper River, providing a wide corridor on the opposite, deep, side of the river bend for Atlantic sturgeon to avoid sounds that may affect their behavior. The distance from the outer, midstream-most edge of the NPTU dock to the opposite side of the Cooper River is approximately 200 m.

Popper and Hastings (2009) summarized seven recent experimental studies that examined the effects of pile driving on various species of fish, none of which were as evolutionarily primitive as sturgeon (Caltrans, 2001 2004; Abbott & Bing-Sawyer 2002; Nedwell et al. 2003, 2006; Abbott et al. 2005; Ruggerone et al. 2008). The studies show considerable inter-species, as well as inter-individual, variation in response to sound in the water. Generally, the extent of damage and mortality was greater for fish closer to the source than farther away.

SUMMARY

The location of the primary holding area for juvenile Atlantic sturgeon being about 10 km upstream of NPTU Charleston and the relatively short radius for sound impacts further substantiate the Navy's original determination that this project may affect, but is not likely to adversely affect, Atlantic sturgeon.

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Table 1. Estimated distances to underwater noise thresholds for fish during NPTU impact pile driving pier extension project

Functional Hearing Group	Underwater Threshold	Distance to Threshold
Injury[(a)]		
All	206 dB re 1 μPa (PEAK)	<1 m
Fish $\geq$ 2 g	187 dB re 1 μPa^2 • sec (SEL)	23 m
Fish < 2 g	183 dB re 1 μPa^2 • sec (SEL)	43 m
Behavior[(b)]	150 dB re 1 μPa (RMS)	215 m

Sources:

(a) Fisheries Hydroacoustic Working Group. 2008. Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities. 12 June.

(b) Hastings, M.C. 2002. Clarification of the Meaning of Sound Pressure Levels and the Known Effects of Sound on Fish. White Paper. Prepared in support of Biological Assessment for San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. August.

Assumptions:

- Practical spreading loss model (dB = 15*log[R1/R2]);
- 24-inch diameter concrete pile;
- 450 strikes per pile and 4 piles installed per day via impact pile driver; and
- Representative peak, sel and rms source levels for a 24-inch concrete pile are from Illinworth & Rodkin (2007): Peak = 185 dB; RMS = 170 dB; SEL = 160 dB; water depth = 5 m.

Illingworth & Rodkin. 2007. Compendium of Pile Driving Sound Data. Prepared for California Department of Transportation, Sacramento, CA by Illinworth & Rodkin, Petaluma, CA. 27 Sep.

APPENDIX G

MARINE MAMMAL OBSERVER PLAN

Marine Mammal Observer Plan
Concrete Pile Driving at the Navy Nuclear Propulsion Training Unit
Charleston, South Carolina

- The distance for potentially altering cetacean behavior as a result of concrete pile driving is estimated to be 46 meters (m). This distance coincides roughly with the distance from the pier to the floating port security barriers (approximately 150 feet).
- A single marine mammal observer (MMO) shall be present to ensure no marine mammals (e.g., bottlenose dolphins and manatees) are present within 46 m of concrete pile driving. The MMO shall be stationed on the pier, or in proximity, such that a 46 m radius can be clearly observed around the pile driving activity.
- The MMO must be capable of spotting and identifying marine mammals (e.g. bottlenose dolphins and manatees). The MMO need not be a marine biologist or have a marine biological background as long as they complete a training session overseen by NAVFAC marine resources staff.
- The water out to 46 m shall be surveyed for at least 10 minutes 1) prior to commencement of concrete pile driving each day or 2) prior to re-initiating pile driving if there has been a period of cessation of pile driving activity that resulted in the MMO vacating their position.
- No concrete pile driving shall occur unless the MMO is continually observing and the 10-minute survey has been completed. Monitoring shall continue through the entire duration required to drive the pile(s) and for a period of at least 10 minutes after pile driving has ended.
- If concrete pile driving occurs during the night, sufficient illumination shall be provided to ensure that marine mammals do not enter the 46 m radius surrounding the pile being driven.
- Concrete pile driving shall cease if a marine mammal comes within 46 m of the activity once pile driving has commenced. Concrete pile driving shall not resume until all marine mammals have moved beyond 46 m zone, by their own volition.
- The MMOs shall use the naked eye to scan the area, but will also be equipped with binoculars (7 x 50 power or greater) to ensure sufficient visual acuity while investigating sightings.
- The MMO shall be equipped with a portable radio and cellular phone to rapidly communicate with the appropriate construction personnel to initiate shutdown of concrete pile driving activity.
- Data shall be collected by MMOs to include date, start and end times for pile driving and observations, marine mammals sighted, and approximate distance from the observation post to the marine mammal. Data sheets with instructions will be supplied by NAVFAC. Completed data sheets shall be provided to the designated NAVFAC representative at the end of each day of observation via email or FAX.
- An after-action report shall be prepared which shall summarize the dates of the action, activities completed, protective measures implemented, and a summary of the monitoring results (i.e. number of marine mammal sightings, number of times shutdown procedures were implemented, etc.). The completed report shall be submitted to the designated NAVFAC representative.

Marine Mammal Observer Plan
Steel Pile Driving at the Navy Nuclear Propulsion Training Unit
Charleston, South Carolina

- Up to eighteen steel piles will be driven. Duration is expected to be nine days.
- Topography of the action area and Cooper River will limit sound travel to 1,500 meters (m).
- Two marine mammal observers (MMOs) shall be present to ensure no marine mammals (e.g., bottlenose dolphins and manatees) are present within the area potentially impacted (Figure 1). One MMO shall be stationed to maximize sight line distance to the north and the other shall be stationed to maximize the sight line distance to the south. Due to the topography of the action area, the maximum distance that would need to be visually surveyed is 1,500 m, but the majority of the area potentially affected is less than this distance (Figure 1).
- The MMOs must be capable of spotting and identifying marine mammals (e.g. bottlenose dolphins and manatees). The MMOs need not be marine biologists or have marine biological backgrounds as long as they complete a training session overseen by NAVFAC marine resources staff.
- The area potentially impacted shall be surveyed for at least 15 minutes 1) prior to commencement of steel pile driving each day or 2) prior to re-initiating pile driving if there has been a cessation of pile driving activity that resulted in both MMOs vacating their positions. To ensure marine mammals are sightable, the initial MMO survey prior to commencement of pile driving should not occur before sunrise. Pile driving shall cease no later than 30 minutes after sunset.
- No steel pile driving shall occur unless the MMOs are continually observing and the 15-minute survey has been completed. Monitoring shall continue through the entire duration required to drive the pile(s) and for a period of at least 15 minutes after pile driving has ended.
- The MMOs shall be stationed on elevated perches at least 20 feet tall. (A scissor lift is envisioned, but any mechanism capable of achieving the desired height in a safe manner would be acceptable.) All appropriate safety guidelines shall be followed.
- The MMOs shall use the naked eye to scan the area, but will also be equipped with binoculars (7 x 50 power or greater) to ensure sufficient visual acuity while investigating sightings.
- The MMOs shall be equipped with portable radios or cellular phones to rapidly communicate with the appropriate construction personnel to initiate shutdown of steel pile driving activity if a marine mammal is sighted.
- Steel pile driving shall cease if a marine mammal is sighted. Steel pile driving shall not resume until all marine mammals have moved out of the area potentially impacted under their own volition.
- Marine mammals are anticipated to enter the action area from the south. If, after three hours from the commencement of steel pile driving activity, no marine mammals are sighted the MMO assigned to the northern station may vacate that station. However, if the MMO assigned to the southern station sights a marine mammal, then the MMO assigned to the northern station must return to that station. If both MMOs vacate their stations (i.e. lunch break), the entire process resets requiring both MMOs .
- Data shall be collected by MMOs to include date, start and end times for pile driving and observations, marine mammals sighted, and approximate distance from the observation post to the marine mammal. Data sheets with instructions will be supplied by NAVFAC. Completed data sheets shall be provided to the designated NAVFAC representative at the end of each day of observation via email or FAX.

- An after-action report shall be prepared which shall summarize the dates of the action, activities completed, protective measures implemented, and a summary of the monitoring results (i.e. number of marine mammal sightings, number of times shutdown procedures were implemented, etc.). The completed report shall be submitted to the designated NAVFAC representative.

Figure 1. Lines of sight for marine mammal observes employed during steel pile driving at the Navy Nuclear Propulsion Test Unit, Charleston, South Carolina. Observer points are approximate. Lines of sight show the maximum distance sound can travel to each shoreline.